GEORGE MUNICIPALITY

Annual Water Services Development Plan Performance- and Water Services Audit Report

as directed by the Water Services Act (Act 108 of 1997) and the Regulations relating to Compulsory National Standards and Measures to Conserve Water

FY 2022/2023
22 October 2023

GEORGE MUNICIPALITY

P O Box 19
George
6530

Tel: +27 (0) 44 801 9266

Ref P09196

iX Engineers
Contact person: Jaco Human
31 Allen Drive, Loevenstein 7530
PO Box 398, Bellville 7535
South Africa
Telephone: +27 (0)21 912 3000
Facsimile: +27 (0)21 912 3222
email: jaco.h@ixengineers.co.za
ABN 61 001 279 812

GEORGE MUNICIPALITY

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Prepared by:

Designation	Name	Contact No.	E-mail
Deputy Director: Water and Sanitation	Mr Deon de Jager	044 801 9352 / 083 453 4781	ddejager@george.gov.za
Municipality: Senior Engineering Technician	Mr Fabian Abrahams	044 801 9348 / 083 452 4805	fabrahams@george.gov.za
Engineer	Mr Jaco Human	021 912 3000 / 084 431 8728	jaco.human@ixengineers.co.za

PROJECT P09196 - GEORGE MUNICIPALITY: ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2022/2023

REV	DESCRIPTION	ORIG	REVIEW	IX ENGINEERS APPROVAL	DATE	CLIENT APPROVAL	DATE
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FOREWORD:

George Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

The WSDP Performance- and Water Services Audit is designed to monitor the compliance of George Municipality with these regulations. The Water Services Act allows the audit to be used as a tool to compare actual performance of George Municipality against the targets and indicators set in their WSDP. It also assists the communities within George Municipality's Management Area and the DWS to assess how well the Municipality is performing relative to their stated intentions and their capacity. The WSDP Performance- and Water Services Audit Report can be seen as an annexure to the Municipality's Annual Report. The Annual Report is compiled as required by the Local Government Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121).

George Municipality's Vulnerability Index for 2023 was indicated as 0.26 "Moderate Vulnerability". The only area of concern evident from the 2023 assessment was Financial Asset Management (Extreme Vulnerability).

The water and sanitation services of George Municipality is managed in a financially sustainable manner, with a surplus generated on the operation and maintenance budgets for water and sewerage services for the last twelve financial years. The Operation and Maintenance budget allocated towards the refurbishment, replacement and maintenance of the existing water and sewerage infrastructure however needs to be increased. A budget of approximately 2% of the total asset value per annum should be allocated towards the replacement of the existing infrastructure. In the case of the operations and maintenance of the systems, a budget of approximately 1% to 2% of the value of the system is typically required to ensure that the systems remain in good condition.

George Municipality also successfully completed various capital projects over the last financial year. The capital budget expenditure, for the 2022/2023 financial year, was R257.462 million (64% of the budget) for the water infrastructure projects and R109.449 million (74% of the budget) for the sewerage infrastructure projects.

The implementation of George Municipality's WDM Strategy assisted to reduce the overall water requirements of the towns significantly. The overall raw water requirements for the George/Wilderness system increased by an annual average of 1.22% over the last nineteen financial years, from 10 631 Ml in 2003/2004 to 13 381 Ml in 2022/2023. The Municipality is also committed to reduce their current NRW and Water Losses to acceptable levels. The overall percentage of NRW was 30.15% (System Input – Revenue Water) and the percentage of Water losses were 18.56% (System Input – Authorised Consumption) for the 2022/2023 financial year.

The Municipality continued with their WC/WDM measures to lower the current and future water requirements and actively plan for the augmentation of their existing water resources for the systems where the future water requirements will exceed the safe yields of the existing resources. The raising of the Garden Route dam spillway by 2.5 metres was started on the 13th of May 2019 and completed during December 2019. The total storage capacity of the Garden Route dam was increased by approximately 25% to 12.5 million m^3. This project increased the safe yield of the George/Wilderness system. The Municipality is also busy with the planning for the rehabilitation of the Kaaimans raw water pump station and the refurbishment of the Outeniqua reclamation plant, which will further improve the assurance of supply.

Comprehensive Operational and Compliance Water Quality and Final Effluent Monitoring Programmes are implemented by George Municipality. The industrial effluent of all industrial consumers are also monitored by George Municipality. The Municipality performed mostly "Excellent" with regard to their Water Quality Compliance for the last number of financial years, according to the SANS 241:2015 classification.

The overall percentage compliance of the water quality samples taken over the period July to June for the last three financial years are indicated in the table below.

Overall percentage compliance of the water quality samples taken over the period July to June for the last three financial years															
Distribution System	Acute Health (%)						Chronic Health			Aesthetic (%)			Operational Efficiency (%)		
	Microbiological			Chemical											
	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22	20/21
All Systems	97.5	100.0	100.0	-	100.0	100.0	99.7	100.0	99.9	98.3	99.2	98.2	97.0	98.2	96.7

The overall percentage compliances of the final effluent samples taken at the WWTWs over the last three financial years are summarised in the table below.

Overall percentage compliance of the final effluent samples taken over the last three financial years									
WWTW	Microbiological (%)			Chemical (%)			Physical (%)		
	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22	20/21
All WWTWs	84.5	94.4	97.3	90.0	91.3	90.8	89.9	88.2	89.6

A comprehensive Performance Management System and Customer Services and Complaints system are in place. George Municipality's WSDP was updated during the 2019/2020 financial year. The Water and Sewer Master Plans are regularly updated and used to guide all future water and sewerage infrastructure planning. WSDP Performance- and Water Services Audit Reports are also compiled annually, as required by the Water Services Act, and approved with the Municipality's Annual Report. The Municipality compiled detail WTW and WWTW Process Audits for all their treatment plants and updated their Water Safety Plan and Wastewater Risk Abatement Plan during the last financial year, as recommended by the DWS.

The Municipality has maintained a high and consistent level of service to its urban water consumers. After hours emergency requests are being dealt with by the control room on a twenty-four hour per day basis. Requests are furthermore captured on an electronic mail or works-order system to ensure the execution thereof.

The Municipality also performed good with DWS's 2021 Blue Drop Risk Assessments (All plants in the low-risk category) and the 2021 Green Drop Assessments (An overall Green Drop Score of 74% and all the plants obtained low risk ratings). The overall management of the wastewater business is commendable and performance in this regard is reflected in the relatively good final effluent quality at most of the plants. The latest Blue and Green Drop and the No Drop (WC/WDM) results still need to be published by the DWS.

GEORGE MUNICIPALITY

WATER SERVICES AUDIT FOR 2022/2023

ITEM **DESCRIPTION** **PAGE**

FOREWORD ..... **ii**

LIST OF TABLES AND FIGURES ..... **vi**

ABBREVIATIONS AND DEFINITIONS ..... **xi**

KEY TERMS AND INTERPRETATIONS ..... **xiii**

EXECUTIVE SUMMARY ..... **xvi**

BACKGROUND **1**

Appointment **1**

Purpose **1**

SECTION A: WATER SERVICES AUTHORITY PROFILE **2**

A.1. Map of Water Services Authority Area of Jurisdiction **2**

A.2. Water Services Administration and Organization **3**

A.3 Water Services Overview **4**

SECTION B: WSDP PERFORMANCE REPORT **11**

B.1 WSDP Reference and Status **11**

B.2 Performance on Water Services Objectives and Strategies **11**

B.3 Status of Water Services Projects 16

B.4 Past Financial Year Water Services Project Impact Declaration 21

SECTION C: WATER SERVICES AUDIT REPORT **25**

C.1 Quantity of Water Services Provided (Water Balance) 25

C.2 Water Services Delivery Profile 30

C.2.1 User Connection Profile 31

C.2.2 Residential Water Services Delivery Access Profile 38

C.2.3 Residential Water Services Delivery Adequacy Profile 45

C.3 Cost Recovery and Free Basic Services 47

C.3.1 Tariffs 47

C.3.2 Metering, Billing and Free Basic Services 55
C.3.3 Revenue Collection and Cost Recovery 57
C.4 Water Quality 66
C.4.1 Sampling Programme 66
C.4.2 Water Quality Compliance 76
C.4.3 Incident Management 80

C.5 Water Conservation and Water Demand Management 85
C.6 Water Services Asset Management 97
C.7 Water Services Operation and Maintenance 103
C.8 Water Resources 106
C.9 Water Services Institutional Arrangements and Customer Services 112

SECTION D: APPROVAL AND PUBLICATION RECORD 120

REFERENCES

ATTENDANCE REGISTER (DISCUSSION OF DRAFT REPORT)

ANNEXURES:

Annexure A: IWA Water balances for the various distribution systems
Rainfall and WWTW's flows and capacities
WTW's flows and capacities
Billed metered consumption and number of consumer units
Water usage per sector for the George / Wilderness system

Annexure B: DWS's No Drop Spreadsheet
ILI for the various distribution systems
DWS's scorecard for assessing the potential for WC/WDM efforts

Annexure C: Future Water Requirement Projections for the various distribution systems

Annexure D: Water Quality Compliance Sample Results
Final Effluent Quality Compliance Sample Results
Industrial Effluent Quality Sample Results

Annexure E: Organisational Structure: Civil Engineering Services Directorate

LIST OF TABLES AND FIGURES

TABLES

Table A.2.1 Water Services Administrative Structure ... 3
Table A.3.1 Water and Wastewater (Sanitation) challenges included in the 2021/2022 Annual Report ... 5
Table A.3.2 Existing main water infrastructure (Resources and WTWs) ... 6
Table A.3.3 Existing Capacities and Flows at each of the WTWs (Ml/d) ... 6
Table A.3.4 Existing water infrastructure (Reticulation, pump stations and reservoirs) ... 6
Table A.3.5 Existing sewerage infrastructure ... 7
Table A.3.6 Existing hydraulic design capacities and flows at each of the WWTWs (Ml/d) ... 7
Table A.3.7 Existing organic design capacities and historical loadings at the WWTWs ... 8
Table A.3.8 Historical population and household data of George Municipality ... 8
Table A.3.9 Annual population growth percentages, population and households per distribution system 8
Table A.3.10 Water Services Overview (Water) ... 9
Table A.3.11 Water Services Overview (Sanitation) ... 10
Table B.1.1 WSDP and Reporting Reference ... 11
Table B.2.1 Performance on Water Services Objectives and Strategies per WSDP Topic ... 12
Table B.3.1 Water Services Projects Status and Performance ... 17
Table B.3.2 Sewerage Services Projects Status and Performance ... 19
Table B.4.1 Past Financial Year Project Impact Declaration for Water Projects ... 21
Table B.4.2 Past Financial Year Project Impact Declaration for Sewerage Projects ... 23
Table C.1.1 Bulk raw water supplied to the various distribution systems ... 26
Table C.1.2 Quantity of Water Services Provided / Water Balance ... 27
Table C.1.3 Annual volume billed metered consumption for each user sector (Ml) ... 28
Table C.1.4 Volume of effluent received at the various WWTWs ... 29
Table C.1.5 Current effluent re-used practices at the various WWTWs ... 29
Table C.2.1 Norms and standards for levels of water supply services ... 30
Table C.2.2 Norms and standards for levels of sanitation services ... 30
Table C.2.1.1 User Connection Profile (Water Services) ... 31
Table C.2.1.2 User Connection Profile (Wastewater Services) ... 33
Table C.2.1.3 Number of user connections in each user sector for the George and Wilderness distribution system ... 35
Table C.2.1.4 Number of user connections in each user sector for the Uniondale distribution system ... 36
Table C.2.1.5 Number of user connections in each user sector for the Haarlem distribution system ... 36
Table C.2.1.6 Swift analysis for George Municipality (June 2023) ... 37
Table C.2.2.1 Residential water services delivery access profile: Water ... 38
Table C.2.2.2 Residential water service levels ... 39
Table C.2.2.3 Residential water services delivery access profile: Sanitation ... 40
Table C.2.2.4 Residential sanitation service levels ... 41

LIST OF TABLES AND FIGURES / Continue

Table C.2.2.5 Interim water and sanitation services (National Norms and Standards for Domestic Water and Sanitation Services) 41

Table C.2.2.6 Sanitation and Water communal service levels in informal areas 42

Table C.2.2.7 Service Levels at Schools 44

Table C.2.2.8 Service Levels at Medical Facilities 44

Table C.2.3.1 Residential Water Services Delivery Adequacy Profile (Water) 45

Table C.2.3.2 Residential Water Services Delivery Adequacy Profile (Sanitation) 46

Table C.3.1.1 Water tariffs for George and Wilderness for the last five financial years 47

Table C.3.1.2 Basic availability charge applicable to all vacant erven in George and Wilderness for the last five financial years 50

Table C.3.1.3 Water Tariffs for Uniondale and Haarlem for the last five financial years 50

Table C.3.1.4 Sewerage Tariffs for George Municipality for the last five financial years 52

Table C.3.2.1 Overview of Metering, Billing and Free Basic Services 55

Table C.3.3.1 Overview of Water Services Revenue Collection and Cost Recovery 57

Table C.3.3.2 Summary of operational and maintenance budget for water and sewerage services for the last five financial years 59

Table C.3.3.3 Detail operational and maintenance expenditure budget for Water Purification, Water Distribution and Filtration Plant services for the last five years financial years. 60

Table C.3.3.4 Detail operational and maintenance expenditure budget for Sewerage, Water Contamination Control and Laboratory services for the last five financial years 61

Table C.3.3.5 Operational income budget for water and sewerage services for the last five financial years 62

Table C.3.3.6 Analysis of Consumer Debtors age in days as at 30 June for water services for the last five financial years 62

Table C.3.3.7 Analysis of Consumer Debtors age in days as at 30 June for sewerage services for the last five financial years 63

Table C.3.3.8 Analysis of Debtors age by income source as at 30 June for the last three financial years 64

Table C.3.3.9 Analysis of Debtors age by customer group as at 30 June for the last three financial years 65

Table C.4.1.1 Sampling Programme for Potable Water Quality 66

Table C.4.1.2 George Municipality's compliance of the monthly E.Coli monitoring frequency in the water distributions systems in terms of the minimum requirements of SANS 241-2:2015 (Table 2). 67

Table C.4.1.3 Sampling Programme for Wastewater Effluent Quality (Outeniqua, Gwaing, Kleinkrantz and Uniondale) 68

Table C.4.1.3 Sampling Programme for Wastewater Effluent Quality (Herolds Bay and Haarlem) 68

Table C.4.1.4 George Municipality's Water and Wastewater Quality Monitoring Programme 69

Table C.4.1.5 Compliance to the Sampling Programme (s) 70

Table C.4.1.6 Water Quality Monitoring Overview from WSDP Guide Framework Perspective 71

Table C.4.1.7 Wastewater Quality Monitoring Overview from WSDP Guide Framework Perspective 71

LIST OF TABLES AND FIGURES / Continue

Table C.4.1.8 Blue Drop Performance of the Municipality (DWS's 2014 Blue Drop Report) 72
Table C.4.1.9 BDRR for the George Municipality's water supply system (2022) 72
Table C.4.1.10 Average residential daily consumption (l/p/d) for the last four financial years. 73
Table C.4.1.11 Green Drop Performance of the George Municipality (DWS's 2022 Green Drop Report) ... 74
Table C.4.2.1 Overview of Water Quality Compliance 76
Table C.4.2.2 Number of water quality samples taken throughout the various water distribution systems during the last three financial years 76
Table C.4.2.3 Percentage compliance of the water quality samples for the last three financial years..... 78
Table C.4.2.4 Four categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified 78
Table C.4.2.5 Overview of Wastewater Quality Compliance 79
Table C.4.2.6 Percentage microbiological (E.Coli) compliance of the compliance samples taken at the various WWTWs for the last three financial years 79
Table C.4.2.7 Percentage chemical compliance of the compliance samples taken at the various WWTWs for the last three financial years 79
Table C.4.2.8 Percentage physical compliance of the compliance samples taken at the various WWTWs for the last two financial years 80
Table C.4.3.1 Medium and High risks for the various WTWs and water distribution systems 80
Table C.4.3.2 Medium and High risks for the various WWTWs and sewer drainage networks 81
Table C.4.3.3 Incident Management and Reporting Overview 83
Table C.4.3.2 Water Quality Incident Reporting Compliance (Health Oriented) 84
Table C.5.1 Overview of WC/WDM Activities 85
Table C.5.2 Treatment Losses, NRW, Water Losses and ILIs for the various water distribution systems 87
Table C.5.3 System input volume, average billed metered consumption and non-revenue water in litre per connection per day for the various water distribution systems for 2022/2023. 88
Table C.5.4 Static pressure experienced by consumers for the various distribution systems 88
Table C.5.5 Length and average head of water pipelines 89
Table C.5.6 Existing and future WDM measures included in George Municipality's WDM Strategy 91
Table C.5.7 Top five bulk water pipeline and top ten water reticulation networks PRP projects..... 92
Table C.5.8 Top five bulk sewer pipeline and top ten sewer reticulation networks PRP projects 93
Table C.5.9 Billed-, flat rate-, no consumption and informal connection count (June 2023) 94
Table C.5.10 Large water users for the last four financial years (AADD > 20 kl/d) 95
Table C.6.1 Total Cost and Book Value of the water infrastructure 97
Table C.6.2 Overview of the RUL by facility type for the water infrastructure (Total Cost) 98
Table C.6.3 Overview of age distribution by facility type for the water infrastructure (Total Cost) 98
Table C.6.4 Total Cost and Book Value of all sewerage infrastructure 99
Table C.6.5 Overview of the RUL by facility type for the sewerage infrastructure (Total Cost) 100
Table C.6.6 Overview of the age distribution by facility type for the sewerage infrastructure (Total Cost) 101

LIST OF TABLES AND FIGURES / Continue

Table C.7.1 Types of Planned and Unplanned Preventative and Corrective Maintenance implemented by George Municipality 103

Table C.7.2 George Municipality's Operation and Maintenance Assessments and Plans 103

Table C.7.3 Recommended budgets for the replacement and the operation and maintenance of the existing water and sewerage infrastructure 105

Table C.7.4 Historical annual water and sewerage capital expenditure 105

Table C.8.1 Projected future water requirements and yield / licence surplus (+) / shortfall (-) based on WSDP model 106

Table C.8.2 Years in which the annual water requirement will exceed the sustainable yield from the various resources 107

Table C.8.3 Approved Licence for George (No. 16/K30C/C/2531) 107

Table C.8.4 Short, medium and long term source augmentation options 108

Table C.8.5 Potential future water resources for the various towns (Summary of DWS's All Towns Reconciliation Strategies) 109

Table C.8.6 Compliance percentages of industrial effluent discharged by industrial consumers per parameter for the various financial years 110

Table C.9.1 Training provided during the 2022/2023 financial year (Workplace Skills Plan) 112

Table C.9.2 Staff composition for Water Services for the last three financial years 112

Table C.9.3 Staff composition for Waste Water Services for the last three financial years 113

Table C.9.4 Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality 114

FIGURES

Figure A.1.1 Location of George Municipality in the Western Cape 2

Figure A.1.2 George Municipality's Management Area 2

Figure C.1.1 Total annual bulk raw water supply to all the towns in George Municipality 25

Figure C.1.2 Bulk raw water supplied to the George/Wilderness, Uniondale and Haarlem systems 25

Figure C.1.3 Quantity of water services provided / water balance 26

Figure C.1.4 Annual water usage per sector for the George/Wilderness system 29

Figure C.2.1.1 User connection profile for water 32

Figure C.2.1.2 User connection distribution for water – Year 2022/2023 32

Figure C.2.1.3 Number of new water connections provided during 2022/2023 32

Figure C.2.1.4 User connection profile for wastewater 34

Figure C.2.1.5 User connection distribution for wastewater – Year 2022/2023 34

Figure C.2.1.6 Number of new wastewater connections provided during 2022/2023 34

Figure C.2.1.7 Number of user connections in each user sector for George and Wilderness 35

Figure C.2.1.8 Number of user connections in each user sector for Uniondale 36

Figure C.2.1.9 Number of user connections in each user sector for Haarlem 37

Figure C.2.2.1 Household water access profile 38

Figure C.2.2.2 Household sanitation access profile 40

Figure C.3.2.1 Number of new water connections per financial year for the different connection sizes 56

LIST OF TABLES AND FIGURES / Continue

Figure C.3.2.2 Number of water meters replaced, relocated, tested, removed, leaks repaired and other repairs per financial year 56

Figure C.3.3.1 Revenue collection and cost recovery profile (Water) 58

Figure C.3.3.2 Revenue collection and cost recovery profile (Wastewater) 58

Figure C.3.3.3 Total Debtors by Income Source for the last five financial years 63

Figure C.3.3.4 Total Debtors by Customer Group for the last five financial years 63

Figure C.4.3.1 Number of pipe bursts reported and repaired by the Municipality 83

Figure C.5.1 System Input Volume and NRW for the George/Wilderness, Uniondale and Haarlem systems 86

Figure C.5.2 Annual treatment losses, NRW and water losses for the George / Wilderness system 86

Figure C.5.3 Bulk and reticulation networks water PRP projects 93

Figure C.5.4 Bulk and reticulation networks sewer PRP projects 94

Figure C.6.1 Book Value and Total Cost of the Water Infrastructure 97

Figure C.6.2 Remaining Useful Life of the water infrastructure 98

Figure C.6.3 Age distribution of water infrastructure 99

Figure C.6.4 Book Value and Total Cost of the sewerage infrastructure 100

Figure C.6.5 Remaining Useful Life of the sewerage infrastructure 101

Figure C.6.6 Age distribution of the sewerage infrastructure 102

Figure C.8.1 Future water requirement projections for the George / Wilderness water distribution system 106

Figure C.8.2 Average annual industrial effluent compliance for the last six financial years 111

Figure C.9.1 Spider Diagram of the vulnerability levels of George Municipality for 2022 114

Figure C.9.2 Number of water related complaints received from the public per financial year 118

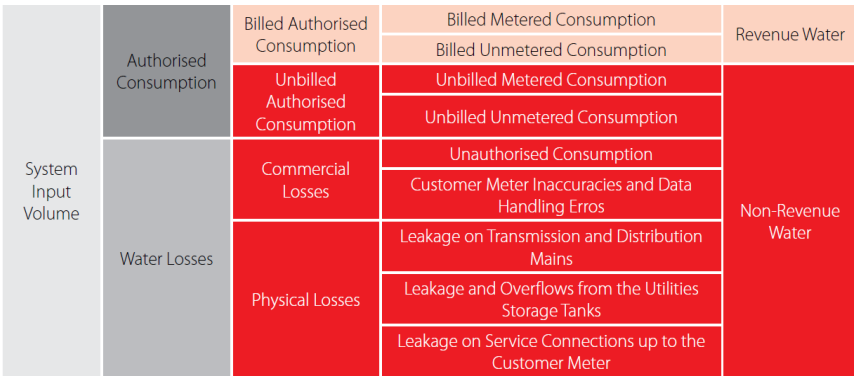
ABBREVIATIONS AND DEFINITIONS

AADD	Average Annual Daily Demand
AIDS	Acquired Immune Deficiency Syndrome
BDRR	Blue Drop Risk Rating
BDS	Blue Drop System
BNR	Biological Nutrient Removal
BPT	Break Pressure Tank
CAH	Chemical Acute Health
CCH	Chemical Chronic Health
CF	Consequence of Failure
CNA	Chemical Non-Health Aesthetic
COD	Chemical Oxygen Demand
CRC	Current Replacement Cost
CRR	Cumulative Risk Ratio
D	Disinfectant
DLG	Department of Local Government
DRC	Depreciated Replacement Cost
DWQ	Drinking Water Quality
DWS	Department of Water and Sanitation
ESETA	Energy Sector Education and Training Authority
ESKOM	Electricity Supply Commission
GAMAP	General Accepted Municipal Accounting Practice
GIS	Geographic Information Systems
GPS	Global Positioning System
GRD	Garden Route Dam
GRP	Glass Fiber Reinforced Plastics
HIV	Human Immunodeficiency Virus
HL	High Level
IAM	Infrastructure Asset Management
ICT	Information and Communications Technology
IDP	Integrated Development Plan
ILI	Infrastructure Leakage Index
IMQS	Information Management Quality Systems
IRIS	Integrated Regulatory Information System
IT	Information Technology
IUDG	Integrated Urban Development Grant
IWA	International Water Association
KPI	Key Performance Indicator
l/c/d	Litre per Capita per Day
LF	Likelihood of Failure
LGTAS	Local Government Turn Around Strategy
LM	Local Municipality
l/p/d	Litre per Person per Day
M	Microbiological
MAH	Microbiological Acute Health
MDRG	Municipal Disaster Response Grant

ABBREVIATIONS AND DEFINITIONS / Continue

MFMA	Municipal Finance Management Act
MIG	Municipal Infrastructure Grant
MISA	Municipal Infrastructure Support Agent
Ml	Mega Litre
Ml/a	Mega Litre per Annum
Ml/d	Mega Litre per Day
MP	Master Plan
MuSSA	Municipal Strategic Self-Assessment
NQF	National Qualifications Framework
NRW	Non-Revenue Water
O	Operational
O&M	Operation and Maintenance
P	Physical
PAT	Progress Assessment Tool
PFD	Process Flow Diagram
PRP	Pipeline Replacement Potential
PRV	Pressure Reducing Valve
PS	Pump Station
RBIG	Regional Bulk Infrastructure Grant
RDP	Reconstruction and Development Programme
RUL	Remaining Useful Life
SALGA	South African Local Government Association
SANS	South African National Standard
SDBIP	Service Delivery and Budget Implementation Plan
SDF	Spatial Development Framework
SST	Secondary Settling Tank
TMG	Table Mountain Group
UISP	Upgrading of Informal Settlement Programme
VAT	Value Added Tax
WC/WDM	Water Conservation and Demand Management
WDM	Water Demand Management
WHO	World Health Organisation
WMA	Water Management Area
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSI	Water Services Institution
WSP	Water Services Provider
WSS	Water Supply System
WTP	Water Treatment Plant
WTW	Water Treatment Works
W_2RAP	Wastewater Risk Abatement Plan
WWTW	Wastewater Treatment Works

KEY TERMS AND INTERPRETATIONS

KEY TERMS	INTERPRETATIONS
Current replacement cost (CRC)	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset. GAMAP defines CRC as the cost the entity would incur to acquire the asset on the reporting date.
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset.
Financial Year	Financial year means in relation to- • a national or provincial department, the year ending 31 March; or • a municipality, the year ending 30 June.
Integrated Development Plan (IDP)	An IDP is a legislative requirement for municipalities, which identifies the municipality's key development priorities; formulates a clear vision, mission and values; formulates appropriate strategies; shows the appropriate organisational structure and systems to realise the vision and the mission and aligns resources with the development priorities.
International Water Association (IWA) Water Balance	
System Input Volume	The volume of treated water input to that part of the water supply system to which the water balance calculation relates.
Authorised Consumption	The volume of metered and/or un-metered water taken by registered customers, the water supplier and others who are implicitly or explicitly authorised to do so by the water supplier, for residential, commercial and industrial purposes. It also includes water exported across operational boundaries. Authorised consumption may include items such as firefighting and training, flushing of mains and sewers, street cleaning, watering of municipal gardens, public fountains, frost protection, building water, etc. These may be billed or unbilled, metered or unmetered.
Water Losses	The difference between System Input and Authorised Consumption. Water losses can be considered as a total volume for the whole system, or for partial systems such as transmission or distribution schemes, or individual zones. Water Losses consist of Physical Losses and Commercial Losses (also known as Real Losses and Apparent Losses).
Billed Authorised Consumption	Those components of Authorised Consumption which are billed and produce revenue (also known as Revenue Water). Equal to Billed Metered Consumption plus Billed Unmetered Consumption.
Unbilled Authorised Consumption	Those components of Authorised Consumption which are legitimate but not billed and therefore do not produce revenue. Equal to Unbilled Metered Consumption plus Unbilled Unmetered Consumption.
Commercial Losses	Includes all types of inaccuracies associated with customer metering as well as data handling errors (meter reading and billing), plus unauthorised consumption (theft or illegal use). Commercial losses are called "Apparent Losses" by the International Water Association and in some countries the misleading term "Non-Technical Losses" is used.
Physical Losses	Physical water losses from the pressurized system and the utility's storage tanks, up to the point of customer use. In metered systems this is the customer meter, in unmetered situations this is the first point of use (stop tap/tap) within the property. Physical losses are called "Real Losses" by the International Water Association and in some countries the misleading term "Technical Losses" is used.
Billed Metered Consumption	All metered consumption which is also billed. This includes all groups of customers such as domestic, commercial, industrial or institutional and also includes water transferred

KEY TERMS	INTERPRETATIONS
	across operational boundaries (water exported) which is metered and billed.
Billed Unmetered Consumption	All billed consumption which is calculated based on estimates or norms but is not metered. This might be a very small component in fully metered systems (for example billing based on estimates for the period a customer meter is out of order) but can be the key consumption component in systems without universal metering. This component might also include water transferred across operational boundaries (water exported) which is unmetered but billed.
Unbilled Metered Consumption	Metered Consumption which is for any reason unbilled. This might for example include metered consumption by the utility itself or water provided to institutions free of charge, including water transferred across operational boundaries (water exported) which is metered but unbilled.
Unbilled Unmetered Consumption	Any kind of Authorised Consumption which is neither billed nor metered. This component typically includes items such as fire-fighting, flushing of mains and sewers, street cleaning, frost protection, etc. In a well-run utility it is a small component which is very often substantially overestimated. Theoretically this might also include water transferred across operational boundaries (water exported) which is unmetered and unbilled – although this is an unlikely case.
Unauthorised Consumption	Any unauthorised use of water. This may include illegal water withdrawal from hydrants (for example for construction purposes), illegal connections, bypasses to consumption meters or meter tampering.
Customer Metering Inaccuracies and Data Handling Errors	Commercial water losses caused by customer meter inaccuracies and data handling errors in the meter reading and billing system.
Leakage on Transmission and /or Distribution Mains	Water lost from leaks and breaks on transmission and distribution pipelines. These might either be small leaks which are still unreported (e.g. leaking joints) or large bursts which were reported and repaired but did obviously leak for a certain period before that.
Leakage and Overflows at Utility's Storage Tanks	Water lost from leaking storage tank structures or overflows of such tanks caused by e.g. operational or technical problems.
Leakage on Service Connections up to point of Customer Metering	Water lost from leaks and breaks of service connections from (and including) the tapping point until the point of customer use. In metered systems this is the customer meter, in unmetered situations this is the first point of use (stop tap/tap) within the property. Leakage on service connections might be reported breaks but will predominantly be small leaks which do not surface and which run for long periods (often years).
Revenue Water	Those components of Authorised Consumption which are billed and produce revenue (also known as Billed Authorised Consumption). Equal to Billed Metered Consumption plus Billed Unmetered Consumption.
Non-Revenue Water	Those components of System Input which are not billed and do not produce revenue. Equal to Unbilled Authorised Consumption plus Physical and Commercial Water Losses.
Municipal Finance Management Act (MFMA)	Municipal Finance Management Act, 2003 (Act No. 56 of 2003)
Remaining useful life (RUL)	The time remaining over which an asset is expected to be used.
Service Delivery Budget Implementation Plan (SDBIP)	The SDBIP is a management, implementation and monitoring tool that enable the Municipal Manager to monitor the performance of senior managers, the Mayor to monitor the performance of the Municipal Manager, and for the community to monitor the performance of the municipality.
Strategic Framework for Water Services	The Strategic Framework provides a comprehensive summary of policy with respect to the water services sector in South Africa and sets out a strategic framework for its implementation over the next ten years.
Water Conservation	The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.
Water Demand Management	The adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability.
Water Services Authority (WSA)	A water services authority means a municipality with the executive authority and the right to administer water services as authorised in terms of the Municipal Structures Act, 1998 (Act No.117 of 1998). There can only be one water services authority in any specific area. Water services authority area boundaries cannot overlap. Water services authorities are metropolitan municipalities, district municipalities and authorised local municipalities.
Water Services Development Plan	A plan to be developed and adopted by the WSA in terms of the Water Services Act, 1997 (Act No.108 of 1997)

KEY TERMS	INTERPRETATIONS
(WSDP)	
WSDP Guide Framework	Modular tool which has been developed by the DWS to support WSAs in complying with the Water Services Act with respect to Water Services Development Planning and which is also used by the DWS to regulate such compliance.
Water Services Provider (WSP)	A WSP means any person or institution who provides water services to consumers or to another water services institution, but does not include a water services intermediary.

GEORGE MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2022/2023

EXECUTIVE SUMMARY

George Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

Section 62 of the Water Services Act requires the Minister to monitor every WSI in order to ensure compliance with the prescribed national standards. This regulation requires a WSA to complete and submit a WSDP Performance- and Water Services Audit Report every financial year.

The WSDP Performance- and Water Services Audit is designed to monitor the compliance of the WSA and other WSIs with these regulations. The Water Services Act allows the audit to be used as a tool to compare actual performance of the WSA against the targets and indicators set in their WSDP. The WSDP Performance- and Water Services Audit also assists local communities and DWS to assess how well WSAs are performing relative to their stated intentions and their capacity.

The WSDP Performance- and Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2022/2023 financial year, and can be seen as an annexure to George Municipality's Annual Report. The Annual Report is compiled as required by the Local Government: Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121).

Availability of the Water Services Audit Report: The WSDP Performance- and Water Services Audit Report is a public document and must be made available within four months after the end of each financial year and must be available for inspection at the offices of the WSA. It is also recommended that the document be placed on the Municipality's website and that copies of the document be placed at the public libraries. The WSDP Performance- and Water Services Audit Report also needs to be made available to the Minister of the DWS, the Minister of the Department of Cooperative Governance, the Province and to SALGA, as required by the Water Services Act, 1997.

The WSDP Performance- and Water Services Audit Report include the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2022/2023 financial year, as included in the Municipality's SDBIP.
- The Municipality's Performance with regard to DWS's Blue and Green Drop Assessments. Blue drop status is awarded to those water schemes that comply with 95% criteria on drinking water quality management. Green drop status is awarded to those WWTWs that comply with 90% criteria on key selected indicators on wastewater quality management.
- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.
- Information to be included in a WSDP Performance- and Water Services Audit as stipulated in regulations under section 9 of the Water Services Act, "Guidelines for Compulsory National Standards" and also required by DWS's 2014 WSDP Performance- and Water Services Audit Report guidelines.
- Information on the implementation of the various WSDP activities, as included under the WSDP Business Elements in DWS's WSDP guidelines.

The Municipality has a comprehensive Performance Management System in place. The SDBIP is the process plan and performance indicator / evaluation for the execution of the budget. The SDBIP is being used as a management, implementation and monitoring tool that assists and guide the Executive Mayor, Councillors, Municipal Manager, Senior Managers and the community. The plan serves as an input to the performance agreements of the Municipal Manager and Directors. It also forms the basis for the monthly, quarterly, mid-year and the annual assessment report and performance assessments of the Municipal Manager and Directors.

The following water and sanitation related investigations were successfully completed during the last financial year.

- The Water Services Audit Report for 2021/2022 was finalised and approved by Council as part of the Annual Report. The NRW water balance models were updated for each of the distribution systems (Up to the end of June 2022) as part of the Water Services Audit Process.

- George Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). Sample results are loaded on a monthly basis onto DWS's IRIS. All the WTWs and WWTWs are also registered on the IRIS website. The effluent discharged by the industrial consumers is also monitored by George Municipality on a monthly basis.

- The Water and Sewer Master Plans for the various distribution and drainage systems are updated on a quarterly basis. The Water and Sewer Master Plans are also worked through with the personnel of the Civil Engineering Services Directorate.

- The Asset Register was updated to include all the water and sewerage capital projects completed during the 2022/2023 financial year.

- The following Water Safety Plans were compiled:
  - Water Safety Plan for George and Wilderness;
  - Water Safety Plan for Uniondale; and
  - Water Safety Plan for Haarlem.

- The following Wastewater Risk Abatement Plans (W_2RAPs) were compiled:
  - W_2RAP for Outeniqua WWTW and Drainage Network;
  - W_2RAP for Gwaing WWTW and Drainage Network;
  - W_2RAP for Herolds Bay WWTW and Drainage Network;
  - W_2RAP for Kleinkrantz WWTW and Drainage Network;
  - W_2RAP for Uniondale WWTW and Drainage Network; and
  - W_2RAP for Kleinkrantz WWTW and Drainage Network.

- Detail WTW Process Audits were completed for the Old George WTW, New George WTW, Wilderness WTW, Uniondale WTW and Haarlem WTW.

- Detail WWTW Process Audits were completed for the Outeniqua WWTW, Gwaing WWTW, Herolds Bay WWTW, Kleinkrantz WWTW, Uniondale WWTW and Haarlem WWTW.

- The following Technical Reports were completed during the last financial year:

  - A Design Report was completed for the Replacement of the Kaaimans Raw Water Pumps and Minor Electrical Works, Zutari, Revision 0, 14 March 2022.

  - A Design Report was completed for a New 30Ml Raw Water Balancing Dam and Associated Works, Zutari, Revision 0, 11 July 2022.

- An Inception Report was completed for the Upgrading of Herolds Bay Sewer Pump Station No 1, George, SMEC, Revision 1, 13 January 2023.
- A Detailed Design Report was completed for the Upgrading of the Industrial Water Pipeline, George, SMEC, 13 January 2023.
- A Draft Design Report was completed for the Upgrading of Thembalethu No. 6 Sewer Pumps Station SMEC, 31 January 2023.
- A Desing Report was completed for the Parkdene Water Reticulation Upgrading Phase 2, Lukhozi Consulting Engineers, Revision No. 1, 2 March 2023.
- A Preliminary Design Report was completed for the Pacaltsdorp Bulk Water Supply – New 14.5Ml Capacity Reservoir, Royal HaskoningDHV, 30 March 2023.
- A Preliminary Design Report was completed for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Pacaltsdorp Pump Station No.3 and Rising Main and Abandonment of Pump Station No.6: Portion 2: Civil, Structural, Mechanical & Electrical Upgrades of Pump Station, Lyners, Revision 1, May 2023.
- A Concept and Viability Report was compiled for the Upgrading of Eden Pumpstation and Associated Infrastructure Phase 2, Lukhozi Consulting Engineers, Revision 1, 8 May 2023.
- A Preliminary Design Report was completed for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Pacaltsdorp Pump Station No.3 and Rising Main and Abandonment of Pump Station No.6: Portion 1: Pump Station No. 3 Rising Main and Abandonment of Pump Station No. 6 with Associated Gravity Pipeline, Lyners, Revision 3, June 2023.
- A Detailed Design Report was completed for the Upgrading of Meul Pumpstation – Phase 2, Portion 1: Rising Main & Civil Infrastructure, Lyners, Revision 3, June 2023.
- A Preliminary Design Report was completed for the New Pacaltsdorp (East) Reservoir, Water Tower Pumpstation and Associated Works, Zutari, Revision 2, 1 June 2023.
- A Preliminary Design Report was compiled for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Schaapkop Pumpstation and Associated Infrastructure Phase, CL Consult, 5 June 2023.
- A Condition Assessment and Implementation Options Report was completed for the Outeniqua Wastewater Treatment Works – Ultra Filtration Plant, WEC, Revision 02, 20 June 2023.

- The following WSIG Project Business Plans were compiled and submitted to the DWS for potential future funding:
  - Herolds Bay Sanitation Pump Station No.1 and Rising Main Upgrade, 18 July 2022.
  - Extension of the Gwaiing Wastewater Treatment Works: Phase 1B, 11 July 2022.
  - Parkdene Water Reticulation Rehabilitation: Phase 2, 11 July 2022.
  - Upgrading of Thembalethu UISP Bulk Sewer Mains: Phase 4 (Old All Brick Area), 19 July 2022.

The Municipality also received the following awards / acknowledgements:

- **George Municipality's performed well with regard to DWS's 2021 Blue Drop Progress Assessment (Drinking Water Process and Quality). The Blue Drop Risk Ratings for all four systems were in the low-risk category (<50%).** The latest Blue Drop results still need to be published by the DWS.

- **George Municipality is also performing good with regard to wastewater quality management, with an overall Green Drop Score of 74% for DWS's 2021 assessment.** The Green Drop Scores for the six WWTWs and drainage systems were between 64% and 80%. The Wastewater Risk Ratings were at low risk (<50%) for all six WWTWs and drainage systems. The latest Green Drop results still need to be published by the DWS.

George Municipality continued with the following key water and sewerage capital infrastructure projects during the 2022/2023 financial year (Projects with expenditure above R1 million for the last financial year).

- The extension of the New George WTW with an additional 20 Ml/d treatment capacity and the rehabilitation of the Old George WTW (6 Ml/d Module). Generators were purchased and installed at some of the WTWs, in order to provide power during load shedding periods. Filter sand was purchased for the WTWs. Depot facilities were upgraded.
- New extractor fans were installed for the chlorine buildings at the WTWs.
- Generators were purchased and installed for the Garden Route Dam Raw Water Pump Station. The Garden Route dam suction pipework rehabilitation also commenced.
- New fences were installed at some of the WTWs and Reservoirs, in order to prevent theft and vandalism and illegal access to the sites.
- Installation of Smart water meters to monitor water usage more effectively and to reduce NRW and Water Losses commenced. The Municipality also continued with the installation of additional bulk water meters.
- Designs were started for the construction of the new 14.5 Ml reservoir and 2.4 Ml water tower for Pacaltsdorp and the new Thembalethu (East) reservoir, water tower and pump station.
- Designs were started for the construction of the additional raw water balancing dams for George.
- Various sections of the water reticulation networks and sewer drainage networks and pump stations were upgraded as recommended in the Water and Sewer Master Plans. Sections of the old water reticulation networks and sewer drainage networks were also replaced (Implementation of the Pipeline Replacement Programmes).
- The Municipality continued with the designs for the upgrading of the Meul Street, Schaapkop and Thembalethu 6 sewer pump stations. Electrical switch gear was also upgraded at some of the sewer pump stations.
- Designs commenced for the upgrade of the Pacaltsdorp pump station 3 and Eden sewer pump stations.
- The Municipality is busy with the planning and design for the extensions at the Gwaing WWTW with a further 10Ml/day, and the implementation of the additional 3.5 Ml/d capacity. The current capacity of the plant is increased to 11Ml/day.
- The municipality continued with the additional 10 Ml/d Outeniqua WWTW extension, which included odour control.
- New fencing were installed at the Outeniqua and Gwaing WWTW, in order to prevent theft and vandalism and illegal access to the WWTWs.
- Designs were finalised for the implementation of the Kleinkrantz sludge dewatering plant.
- Flood damage at the Outeniqua WWTWs commenced.
- Additional Honey Sucker trucks were purchased for the sewer pump stations and for the emptying of tanks.

Quantity of Water Services Provided (Water Balance)

Detail IWA water balance models are in place for each of the distribution systems in George Municipality's Management Area. These models include the volume of raw water abstracted from the various resources, the treated volume supplied from the WTW (System Input Volume) and the Treatment Losses, NRW and Water Losses for each of the distribution systems. The flows at all the WWTWs, except the Haarlem WWTW, are also metered and recorded by the Municipality.

Water Services Delivery Profile

The number of consumer units per category or user type is available for each of the distribution systems. The 2022/2023 number of formal water consumers in George Municipality was 39 910. The average annual growth in the number of consumers for George, Uniondale and Haarlem over the period 2012/2013 to 2022/2023, last ten financial years, was 1.90%. All the formal households in the urban areas of George Municipality's Management Area are provided with water and sewer connections inside the erven.

Informal areas are supplied with shared services as an intermediary measure. The number of households in informal areas in the urban areas for June 2023 was 8 730. The average ratio of the number of households per communal tap is 20.8 and the ratio for the number of households per communal toilet facility is 6.8 George Municipality's target, with regard to the provision of communal services in the informal areas, is to ensure that at least one toilet is provided for every five (5) households and one tap for every twenty-five (25) households. The number of households above these ratios for water services is 3 489 (Additional 149 communal taps are needed) and for sanitation services it is 3 867 (Additional 784 toilets are needed).

George Municipality is committed to ensure that private landowners provide at least basic water and sanitation services are provided to those households in the rural areas with existing services still below RDP standard.

All the schools in the urban areas of George Municipality's Management Area and all medical facilities are supplied with adequate water and sanitation services.

Cost Recovery and Free Basic Services

A detail seven block step rising water tariff structure is implemented by George Municipality. This tariff system discourages the wasteful or inefficient use of water. It is expected that this tariff structure will continue to be implemented in the future. The sustainable supply of potable water is however becoming an ever increasing challenge.

The first six (6) kl of water is provided free to all residential consumers. George Municipality's tariffs support the viability and sustainability of water supply services to the poor through cross-subsidies where feasible. Free basic water and sanitation services are linked to the Municipality's Indigent Policy and all indigent households therefore receive free basic water and sanitation services. This implies that either the equitable share is used to cover this cost, or higher consumption blocks are charged at a rate greater than the cost in order to generate a surplus to cross-subsidies consumers who use up to six (6) kilolitres per month.

The actual operational and maintenance expenditure and income for the last five financial years for water and sewerage services is summarised in the table below (Unaudited).

Summary of operational and maintenance expenditure and income for water and sewerage services for the last five financial years					
Expenditure / Income	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
Water Services (Water Purification - 835, Water Distribution – 848 and Filtration Plant - 836)					
Expenditure Water Purification	R123 274 621-60	R88 409 129-58	R78 689 667-26	R69 743 504-79	R59 454 661-17
Expenditure Water Distribution	R124 785 244-64	R111 134 239-59	R101 411 557-72	R97 827 401-16	R78 504 736-70
Expenditure Filtration Plant	R0-00	R0-00	R0-00	R487 469-78	R379 338-07
Nett Expenditure	R248 059 866-24	R199 543 369-17	R180 101 224-98	R168 058 375-73	R138 338 735-94
Income Water Purification	(R213 221 807-73)	(R67 701 395-15)	(R568 790-00)	(R9 462 527-77)	(R5 469 775-82)
Income Water Distribution	(R290 297 659-03)	(R223 060 127-68)	(R191 464 478-13)	(R175 286 921-85)	(R178 802 846-66)
Income Filtration Plant	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
Income	(R503 519 466-76)	(R290 761 522-83	(R192 033 268-13)	(R184 749 449-62)	(R184 272 622-48)
(Surplus) / Deficit before Appropriations	(R255 459 600-52)	(R91 218 153-66)	(R11 932 043-15)	(R16 691 073-89	(R45 933 886-54)
Appropriations	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)

Summary of operational and maintenance expenditure and income for water and sewerage services for the last five financial years					
Expenditure / Income	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
(Surplus) / Deficit after Appropriations	**(R255 459 600-52)**	**(R91 218 153-66)**	**(R11 932 043-15)**	**(R16 691 073-89**	**(R45 933 886-54)**
Sewerage Services (Sewerage Mainlines and Pump Stations – 521, Water Contamination Control – 563 and Laboratory Services - 564)					
Expenditure Sewerage Mainlines & PS	R132 961 573-66	R104 574 075-40	R98 855 036-03	R93 809 153-12	R84 004 041-64
Expenditure Water Contamination Control	R55 538 727-43	R46 229 056-51	R44 242 097-51	R39 747 831-80	R36 118 666-75
Expenditure Laboratory Services	R6 159 105-66	R4 222 352-88	R3 571 789-10	R2 950 393-71	R2 875 925-85
Nett Expenditure	R194 659 406-75	R155 025 484-79	R146 668 922-64	R136 507 378-63	R122 998 634-24
Income Sewerage Mainlines & PS	(R270 417 578-77)	(R204 565 370-80)	(R181 129 742-85)	(R156 901 789-26)	(R128 228 546-98)
Income Water Contamination Control	(R0-00)	(R181 231-00)	(R13 094 441-85)	(R2 260 179-64)	(R35 309 908-20)
Income Laboratory Services	(R4 220-20)	(R3 237-48)	(R4 205-17)	(R18 180-97)	(R92 220-44)
Income	(R270 421 798-97)	(R204 749 839-28)	(R194 228 389-87)	(R159 180 149.87	(R163 630 675-62)
(Surplus) / Deficit before Appropriations	(R75 762 392-22)	(R49 724 354-49)	(R47 559 467-23)	(R22 672 771-24)	(R40 632 041-38)
Appropriations	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
(Surplus) / Deficit after Appropriations	**(R75 762 392-22)**	**(R49 724 354-49)**	**(R47 559 467-23)**	**(R22 672 771-24)**	**(R40 632 041-38)**
(Surplus) / Deficit for Water and Sewerage Services before Appropriations	**(R331 221 992-74)**	**(R140 942 508-15)**	**(R59 491 510-38)**	**(R39 363 845-13)**	**(R86 565 927-92)**
(Surplus) / Deficit for Water and Sewerage Services after Appropriations	**(R331 221 992-74)**	**(R140 942 508-15)**	**(R59 491 510-38)**	**(R39 363 845-13)**	**(R86 565 927-92)**

Water Quality

George Municipality's Water Quality Policy Statement is as follows:

"George Municipality will at all times, when reasonably possible, provide drinking water that is safe, palatable and aesthetically appealing. Drinking water should not contain chemical, microbial or any other substances that is deleterious to health. The water produced will comply for at least 99% of the time with the microbiological requirements, 95% of the time with Class I and 97% of the time with Class II drinking water quality standards as specified in the latest SANS 241 national standard for drinking water."

Comprehensive Operational and Compliance Water Quality and Final Effluent Monitoring Programmes are implemented by George Municipality. The water quality performance indicators for the water distribution systems in George Municipality is mostly "Excellent", according to the SANS 241:2015 classification. The percentage compliance of the water quality samples taken over the period July to June for the last three financial years for the various distribution systems, with regard to the four SANS:241:2015 categories, are summarised in the table below.

Percentage compliance of the water quality samples taken over the period July to June for the last three financial years (Network sampling points)															
Distribution System	**Acute Health (%)**						**Chronic Health (%)**			**Aesthetic (%)**			**Operational Efficiency (%)**		
	Microbiological			**Chemical**											
	22/23	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**
George	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	100.0	98.7	99.7	99.1	98.9	99.4	98.6
Wilderness	92.9	100.0	100.0	-	100.0	100.0	100.0	100.0	100.0	98.8	99.6	98.9	97.7	99.2	98.3
Uniondale *	98.1	100.0	100.0	-	100.0	100.0	98.9	100.0	100.0	98.6	99.8	99.1	95.4	92.4	94.3
Haarlem *	93.5	100.0	100.0	-	100.0	100.0	98.8	100.0	99.5	93.5	97.5	93.0	88.4	89.8	92.2
All Systems	**97.5**	**100.0**	**100.0**	**-**	**100.0**	**100.0**	**99.7**	**100.0**	**99.9**	**98.3**	**99.2**	**98.2**	**97.0**	**98.2**	**96.7**

Notes: *Unacceptable* (According to SANS241-2:2015, Table 4)
Uniondale and Haarlem include the sample results at the WTWs

The operational water sampling programmes of George Municipality complies with the minimum monitoring requirements of SANS:241-2: 2015 (Table 1: Minimum monitoring for prescribed process risk indicators) for the various WTWs and distribution systems.

The table below indicates the compliance of the monthly E.Coli monitoring frequency in the water distribution systems of George Municipality, in terms of the minimum requirements of SANS:241-2: 2015 (Table 2). The period assessed was for samples taken from July 2022 to June 2023.

George Municipality's compliance of the monthly E.Coli monitoring frequency in the water distributions systems in terms of the minimum requirements of SANS 241-2:2015 (Table 2).			
Distribution System	**Population served**	**Required number of monthly samples (SANS 241-2:2015: Table 2)**	**Number of monthly E.Coli samples taken by Municipality during 2022/2023 ***
George and Wilderness	223 254	44.7	55.9
Uniondale	5 937	2	13.0
Haarlem	2 651	2	8.9

Note: * Include E.Coli samples taken at the WTWs

It can be noted from the above table that the number of monthly E.Coli samples taken over the last financial year for the George/Wilderness, Uniondale and Haarlem distribution systems were adequate.

The final effluent quality complies with the authorised Microbiological, Chemical and Physical limits for most of the WWTWs. The compliance percentages of the final effluent samples taken over the period July to June for the last three financial years at the Outeniqua-, Gwaing-, Kleinkrantz-, Herolds Bay-, Uniondale- and Haarlem WWTW are summarised in the table below.

Overall percentage compliance of the final effluent samples taken over the last three financial years at the various WWTWs									
WWTW	**Microbiological (%)**			**Chemical (%)**			**Physical (%)**		
	22/23	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**	**22/23**	**21/22**	**20/21**
Outeniqua	53.2%	80.0%	92.9%	74.5%	73.3%	73.8%	59.6%	65.2%	65.1%
Gwaing	98.0%	95.7%	100.0%	97.4%	97.3%	95.5%	89.8%	89.1%	85.6%
Kleinkrantz	64.0%	97.8%	100.0%	89.9%	96.7%	95.9%	99.3%	97.8%	99.2%
Herolds Bay	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.0%	100.0%	98.9%
Uniondale	90.2%	93.0%	90.5%	100.0%	100.0%	100.0%	99.0%	83.7%	97.6%
Haarlem	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
All WWTWs	**84.5%**	**94.4%**	**97.3%**	**90.0%**	**91.3%**	**90.8%**	**89.9%**	**88.2%**	**89.6%**

All industrial effluent discharge into the sewer system of George Municipality is monitored. Water Services By-laws, with regard to the discharge of industrial effluent into the sewer system, are also in place and all industrial consumers formally apply for the discharge of industrial effluent into the sewer system. The quality of the industrial effluent discharged by industrial consumers into George Municipality's sewer system is monitored through a comprehensive sampling programme.

WC/WDM

George Municipality's WDM Strategy will enable the municipality to meet the challenge of the growing water requirements on the raw water resources and to ensure that growth and development remains sustainable in the George Municipality's Management Area. The vision of George Municipality's WDM Strategy is as follows:

"George Municipality commits itself, within reason and as far as practically possible, to uphold and continually impose the WDM measures currently in place and to impose new measures where WDM can be further improved"

The implementation of George Municipality's WDM Strategy assisted to reduce the overall water requirements of the towns significantly. The overall percentage of NRW was 30.15% (System Input – Revenue Water) and the percentage of Water losses was 18.56% (System Input – Authorised Consumption) for the 2022/2023 financial year.

The table below gives a summary of the Treatment Losses, NRW, Water Losses and ILIs for the various water distribution systems in George Municipality's Management Area.

Treatment Losses, NRW, Water Losses and ILIs for the various water distribution systems							
Description	**Component**	**Unit**	**22/23**	**Record: Prior (Ml/a)**			
				21/22	**20/21**	**19/20**	**18/19**
George / Wilderness	Treatment Losses	Volume	864.423	1 723.930	1 622.664	1 943.200	1 345.142
		Percentage	6.46%	12.39%	12.93%	15.30%	10.70%
	NRW	Volume	3 703.779	3 539.882	2 829.189	2 719.340	3 312.114
		Percentage	29.59%	29.03%	25.90%	25.28%	29.50%
	Water Losses	Volume	2 222.186	1 937.685	1 371.842	1 754.772	2 703.652
		Percentage	17.75%	15.89%	12.56%	16.31%	24.08%
	ILI		**2.27**	**2.01**	**1.43**	**1.86**	**2.87**
	The Municipality can work towards a target of 10% for the treatment losses. The NRW and Water Losses increased slightly during the last financial year. The Municipality needs to work towards a target of 25% for the NRW. The billed unmetered connections need to be phased out (flat rates), in order to further reduce the NRW. The unbilled unmetered consumption also needs to be addressed (Unmetered informal connections and built erven with zero consumption). The ILI of 2.27 indicates a good management system with no urgent action, but NRW and Water Losses need to be monitored carefully. The Municipality needs to keep the ILI level between 1 and 2.						
Uniondale	Treatment Losses	Volume	-34.490	-5.379	11.148	12.498	15.054
		Percentage	-12.55%	-1.80%	3.61%	4.12%	5.14%
	NRW	Volume	134.693	139.876	109.072	99.189	107.445
		Percentage	43.54%	45.97%	36.69%	34.11%	38.66%
	Water Losses	Volume	121.510	127.243	95.769	92.632	100.553
		Percentage	39.28%	41.82%	32.21%	31.86%	36.18%
	ILI		**9.53**	**10.36**	**7.67**	**7.43**	**8.08**
	The treatment losses are negative and the reason for that needs to be investigated. The NRW and Water Losses were reduced during the last financial year, but are still very high. The Municipality needs to work towards a target of 35% for the NRW and 30% for the Water Losses, where after it can be further reduced. The ILI of 9.53 indicates a very bad management system, which requires immediate water loss reduction interventions.						
Haarlem	Treatment Losses	Volume	13.978	27.829	15.318	15.340	7.545
		Percentage	7.62%	14.09%	7.77%	8.45%	3.87%
	NRW	Volume	79.295	92.225	105.529	83.722	110.344
		Percentage	46.78%	54.34%	58.07%	50.38%	58.91%
	Water Losses	Volume	68.480	80.258	95.662	79.214	104.353
		Percentage	40.40%	47.29%	52.64%	47.66%	55.71%
	ILI		**6.30**	**7.46**	**8.77**	**7.28**	**9.49**
	The treatment losses are at acceptable levels and should be kept below 10%. The NRW and Water Losses were reduced during the last financial year, but are still high. The Municipality needs to work towards a target of 35% for the NRW and 30% for the Water Losses, where after it can be further reduced. The ILI of 6.30 indicates a poor management system, which requires attention.						
TOTAL	**Treatment Losses**	**Volume**	**843.911**	**1 746.380**	**1 649.130**	**1 971.038**	**1 367.741**
		Percentage	**6.10%**	**12.12%**	**12.64%**	**14.95%**	**10.47%**
	NRW	**Volume**	**3 917.767**	**3 771.983**	**3 043.790**	**2 902.251**	**3 529.903**
		Percentage	**30.15%**	**29.77%**	**26.69%**	**25.88%**	**30.19%**
	Water Losses	**Volume**	**2 412.176**	**2 145.186**	**1 563.273**	**1 926.618**	**2 908.558**
		Percentage	**18.56%**	**16.93%**	**13.71%**	**17.18%**	**24.88%**
	The treatment losses are at acceptable levels and should be kept below 10%. The overall NRW needs to be kept below a target of 25% and the Water Losses below a target of 15%. The billed unmetered connections need to be phased out (flat rates) for all the systems, in order to further reduce the NRW. The unbilled unmetered consumption also needs to be addressed (Unmetered informal connections and built erven with zero consumption).						

Note: Infrastructure Leakage Index (ILI) for Developed Countries = **1 – 2 Excellent (Category A)**, **2 – 4 Good (Category B)**, **4 – 8 Poor (Category C)** and > **8 – Very Bad (Category D)**

Category A = No specific intervention required.

Category B = No urgent action required although should be monitored carefully.

Category C = Requires attention

Category D = Requires immediate water loss reduction interventions

The DWS developed the WC/WDM scorecard to establish areas where the municipality has made good progress in relation to WC/WDM and where there is still room for improvement. **The status quo score for George Municipality is 78 out of 100 suggesting that the Municipality is making good progress with regard to the implementation of specific WC/WDM activities.**

Water Services Asset Management

George Municipality updated their current Asset Register during the 2022/2023 financial year. The Total Cost, Book Value, RUL and Age distribution of the water and sewerage infrastructure included in George Municipality's Asset Register is summarised in the table below (June 2023).

Summary of water and sewerage infrastructure assets included in George Municipality's Asset Register (June 2023)					
Asset Type			Total Cost	Book Value	% Book Value / Total Cost
Water Infrastructure			R903 605 265	R533 280 793	59.02%
Sewerage Infrastructure			R759 559 194	R509 225 085	67.04%
Remaining Useful Life					
Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Water Infrastructure	R443 230 772	R328 091 511	R61 256 479	R67 087 648	R3 938 855
Sewerage Infrastructure	R394 466 422	R178 907 226	R75 139 652	R103 698 429	R7 347 465
Age Distribution					
Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Water Infrastructure	R383 599 376	R34 370 221	R303 670 116	R119 888 045	R62 077 507
Sewerage Infrastructure	R382 883 758	R89 232 214	R162 883 505	R70 654 815	R53 904 903

The Total Cost and Book Value in the previous table indicate that 40.98% of the value of the water infrastructure and 32.96% of the value of the sewerage infrastructure has been consumed.

The asset renewal needs for the water infrastructure assets over the next ten years is R77.132 million per year. The reinvestment required is R443.231 million in the first five-year and R328.092 million in the second five-year period. The age of 6.87% of the water infrastructure assets is greater than twenty years. The asset renewal needs for the sewerage infrastructure assets over the next 10 years is R57.337 million per year. The reinvestment required is R394.466 million in the first 5-year and R178.907 million in the second 5-year period. The age of 7.10% of the sewerage infrastructure assets is greater than 20 years.

Some of the key challenges of George Municipality are to identify adequate funds for the rehabilitation and maintenance of their existing infrastructure, which is critical to ensure the sustainability of the services that are provided by the Municipality. It is important for the Municipality to secure adequate funding for major refurbishment and maintenance work, the provision of bulk infrastructure and development of additional sources to keep up with the high demand for services.

Water Services Operation and Maintenance

Design-out Maintenance, Preventative Maintenance and Corrective or Breakdown Maintenance are practised by George Municipality (Planned and unplanned preventative and corrective maintenance). Adequate resources, information and activity control and management are in place to ensure proper operation and maintenance of the water and sewerage infrastructure.

Water Resources

The project for the raising of the Garden Route dam spillway by 2.5 metres was started on the 13th of May 2019 and completed during December 2019. The total storage capacity of the Garden Route dam was increased by approximately 25% to 12.5 million m³. George Municipality is currently busy with a Water Resource Augmentation Study for the George/Wilderness, Uniondale and Haarlem systems, which is expected to be completed by April / May 2024.

The table below gives an overview of the years in which the annual water requirement is likely to exceed the sustainable yield from the various resources.

Years in which the annual water requirement will exceed the sustainable yield from the various resources				
Distribution System	**Total sustainable Yield or Allocation (x 10^6 m^3/a)**	**Annual Growth on 2022/2023 requirement (1.5% or 2.0%)**	**Annual Growth on 2022/2023 requirement (3.0% or 3.5%)**	**WSDP Projection Model**
George / Wilderness	17.000 (Yield)*	2033 (2.0%)	2028 (3.5%)	2032
Uniondale	0.697 (Allocation)	> 2047 (1.5%)	> 2047 (3.0%)	> 2047
Haarlem	0.230 (Allocation)	2037 (1.5%)	2029 (3.0%)	> 2047

Note * Include Malgas Pumping Scheme and Raised Garden Route Dam

The short, medium and long term options previously evaluated through the George Bulk Water Supply Study (2007-2008), to augment the supply to George, included the following.

Short, medium and long term source augmentation options	
Proposed Option	**Comment**
Short to Medium Term Augmentation Options	
Water Demand Management	Was implemented
Refurbishment of Kaaimans River Weir	Was implemented
Malgas River Pumping Scheme	Was implemented
First Phase of the Re-use of Treated Effluent	Was implemented
Raising of Garden Route Dam Spillway	Was implemented
Medium to Longer Term Augmentation Options	
Second Phase of the Re-use of Treated Effluent	Will be considered
Proposed Malgas Dam	Being considered
Longer Term Augmentation Options	
Proposed Maalgate Dam	Feasible, if land acquisition issues can be resolved
Proposed Upper Kaaimans River Dam	Not feasible due to potential excessive environmental impacts
Desalination	Not yet cost effective
Groundwater	Being considered but requires further investigation

Water Services Institutional Arrangements and Customer Services

George Municipality is the official WSA for the entire Municipal Management Area and also acts as the WSP for the whole area. The Municipal personnel is continuously exposed to training opportunities, skills development and capacity building at a technical, operations and management level in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled every year and the specific training needs of the personnel, with regard to water and wastewater management are determined annually.

George Municipality's Vulnerability Index for 2023 was indicated as 0.26 "Moderate Vulnerability". The only area of concern evident from the 2023 assessment was Financial Asset Management (Extreme Vulnerability).

It is important for George Municipality to focus on the rehabilitation and maintenance of the existing water and sewerage infrastructure. The Operation and Maintenance budget allocated towards the refurbishment, replacement and maintenance of the existing water and sewerage infrastructure needs to be increased. A budget of approximately 2% of the total asset value per annum should be allocated towards the replacement of existing infrastructure. In the case of the operations and maintenance of the systems, a budget of approximately 1% to 2% of the value of the system is typically required to ensure that the systems remain in good condition. The Municipality needs to continue to use the updated Water and Sewer Master Plans to guide all future water and sewerage infrastructure planning.

A comprehensive Customer Services and Complaints system is in place at George Municipality and the Municipality has maintained a high and a very consistent level of service to its urban water consumers. After hour emergency requests are being dealt with by the control room on a twenty-four-hour per day basis. Requests are furthermore captured on an electronic mail or works-order system to ensure execution thereof.

The Municipality compiled detail WTW and WWTW Process Audits for all their treatment plants and updated their Water Safety Plan and Wastewater Risk Abatement Plan during the last financial year, as recommended by the DWS. A detailed risk assessment was executed as part of the Water Safety Plan process and the existing control measures implemented by George Municipality were evaluated. An Improvement / Upgrade Plan is also in place with relevant Water and Safety Management Procedures for any type of incident.

Barriers implemented by George Municipality against contamination and deteriorating water quality include the following:

- Participate in Catchment management and water resource protection initiatives.
- Protection at points of abstraction such as river intakes and dams (Abstraction Management).
- Correct operation and maintenance of WTWs (Coagulation, flocculation, sedimentation and filtration).
- Protection and maintenance of the distribution systems. This includes ensuring an adequate disinfectant residual at all times, rapid response to pipe bursts and other leaks, regular cleaning of reservoirs, keeping all delivery points tidy and clean, etc.

Three other important barriers implemented by George Municipality against poor quality drinking water that are a prerequisite to those listed above are as follows:

- A well-informed Council and municipal managers that understand the extreme importance of and are committed to providing adequate resources for continuous professional operation and maintenance of the water supply system.
- Competent managers and supervisors in the technical department who are responsible for water supply services lead by example and are passionate about monitoring and safeguarding drinking water quality.
- Well informed community members and other consumers of water supply services that have respect for water as a precious resource.

GEORGE MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2022/2023

BACKGROUND

Appointment

iX Engineers was appointed by George Municipality to assist them with the compilation of their WSDP Performance- and Water Services Audit Report, which forms part of their annual report for the 2022/2023 financial year. The purpose of the WSDP Performance- and Water Services Audit Report is to report on the implementation of George Municipality's previous year's WSDP, for the 2022/2023 financial year.

The DWS developed the "Annual Water Services Development Plan Performance- and Water Services Audit Report" template during 2014, to assist Municipalities with the drafting of their reports. iX Engineers agreed with George Municipality to follow this template as far as possible.

Purpose

George Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

Section 62 of the Water Services Act requires the Minister to monitor every WSI in order to ensure compliance with the prescribed national standards. This regulation requires a WSA to complete and submit a WSDP Performance- and Water Services Audit every financial year. The WSDP Performance- and Water Services Audit is designed to monitor the compliance of the WSA and other WSIs with these regulations. The Water Services Act allows the audit to be used as a tool to compare actual performance of the WSA against the targets and indicators set in their WSDP. The purpose of the water services audit is as follows:

- To monitor compliance with the Act and these regulations.
- To compare actual performance against targets contained in the WSDPs.
- To identify possibilities for improving water conservation and water demand management.

The WSDP Performance- and Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2022/2023 financial year, and can be seen as an annexure to George Municipality's Annual Report. The Annual Report is compiled as required by the Local Government: Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121). The WSDP Performance- and Water Services Audit Report contain the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2022/2023 financial year, as included in the Municipality's SDBIP.
- The Municipality's Performance with regard to DWS's Blue and Green Drop Assessments. Blue drop status is awarded to those water schemes that comply with 95% criteria on drinking water quality management. Green drop status is awarded to those WWTWs that comply with 90% criteria on key selected indicators on wastewater quality management.
- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.
- Information to be included in a WSDP Performance- and Water Services Audit as stipulated in regulations under section 9 of the Water Services Act, "Guidelines for Compulsory National Standards" and also required by DWS's 2014 WSDP Performance- and Water Services Audit Report guidelines.
- Information on the implementation of the various WSDP activities, as included under the WSDP Business Elements in DWS's WSDP guidelines.

A. WATER SERVICES AUTHORITY PROFILE

A.1. Map of Water Services Authority Area of Jurisdiction

George Municipality is located in the Garden Route District of the Western Cape, as indicated in the figure below.

Figure A.1.1: Location of George Municipality in the Western Cape

The figure below gives an overview of George Municipality's Management Area and the settlements located in the Area.

Figure A.1.2: George Municipality's Management Area

The various schemes supplied with bulk water by George Municipality are discussed in more detail under Section A.3. The existing water and sewerage infrastructure of the various distribution systems are indicated on the Aerial Maps included in the Municipality's detail WSDP documents (Administration, Information and Comprehensive Overview Report, Annexure A).

A.2. Water Services Administration and Organization

George Municipality is the WSA for the entire Municipal Management Area and act as the Water Services Provider for the whole area. George Municipality's Organogram for Civil Engineering Services is included in Annexure E (September 2022). The table below gives the contact details of the persons responsible for water services management and planning within George Municipality.

Table A.2.1: Water Services Administrative Structure	
Accounting Officer	
Designation	Municipal Manager
Name	Dr Michele Gratz
Telephone Nr.	044-801-9111
Fax Nr.	N/A
Cell Nr.	N/A
Email	tduplooy@george.gov.za
WSA Manager	
Designation	Director: Civil Engineering Services
Name	Mr Jannie Koegelenberg
Telephone Nr.	044-801-9260
Fax Nr.	N/A
Cell Nr.	082-765-7776
Email	jkoegelenberg@george.gov.za
WSP Manager	
Designation	Deputy Director: Water and Wastewater Services
Name	Mr Deon De Jager
Telephone Nr.	044-801-9352
Fax Nr.	N/A
Cell Nr.	083-453-4781
Email	ddejager@george.gov.za
WSDP Manager	
Designation	Senior Engineering Technician
Name	Mr Fabian Abrahams
Telephone Nr.	044-801 - 9348
Fax Nr.	N/A
Cell Nr.	083-452-4805
Email	fabrahams@george.gov.za
IDP Manager	
Designation	Manager IDP and PMS
Name	Mr Kosie Haarhoff
Telephone Nr.	044-801-9025
Fax Nr.	N/A
Cell Nr.	083-374-4370
Email	khaarhoff@george.gov.za

A.3. Water Services Overview

George Municipality is situated within the Breede-Gouritz Water Management Area (WMA) and is located within the Garden Route District of the Western Cape Province, in which the following municipalities are also located:

- Hessequa Municipality;
- Mossel Bay Municipality;
- Oudtshoorn Municipality;
- Kannaland Municipality;
- Bitou Municipality; and
- Knysna Municipality

George Municipality consists of twenty-seven (27) individual wards and is the only WSA within the George Municipality's Management Area. The Municipality is also the Water Services Provider (WSP). George Municipality's Management Area includes the following towns and ***Water Distribution Systems***:

- The City of George, the village of Herolds Bay and the coastal resorts of Victoria Bay, Kleinkrantz and Wilderness National Park – ***George / Wilderness System.*** Bulk raw water supply to the George / Wilderness system is from the following water resources.

  Garden Route Dam (GRD) and Swart River Dam

  The GRD was completed in 1979 on the Swart River downstream of its confluence with the Kat River. The GRD previously had a storage capacity of 9.03 million m³ and a historic firm yield of 13.4 million m³/a. The municipality completed the raising of the dam wall by 2.5 metres during December 2019, which increased the storage capacity by approximately 25% to 12.5 million m³.

  A second dam, the Swart River Dam, exists further upstream on the Swart River. This dam was the original source of supply for the town, supplying the WTWs directly by gravity. Due to its small size compared to the GRD, it contributes relatively little and its pipeline has fallen into disuse. At present, the dam is leaking and its outlet works are in a poor state. It is not currently being used to support the GRD in directly supplying the WTWs. However, it is actively making releases into the downstream river and so into the GRD.

  Kaaimans River

  Flow from the Kaaimans River can be diverted into the GRD via the diversion of water at the Kaaimans weir via a 35 Ml/d pump station. The pump station was once active prior to the construction of the GRD, but fell into disuse due to the ample supply from the new dam in its early years. Instead of supplying directly to the WTWs, as was previously the case, it now discharges its flow into the headwater of the GRD. The Kaaimans River resource is however currently not in use and a Technical Report was compiled for the replacement of the raw water pumps and some minor electrical works.

  Touw River

  The Touw River provides raw water abstracted from a natural weir straight to the Wilderness WTW.

  Outeniqua Reclamation Plant

  The first phase of the Outeniqua Reclamation Plant was completed. The reclamation plant treat the sewage effluent from the Outeniqua WWTW to a standard complying with national and international water quality standards. The treated effluent is pumped to the GRD, where it is blended with the raw water before being abstracted and pumped to the WTW. The first phase allows for 10 Ml/d, which will be followed by an additional 5 to 10 Ml/d for Phase 2 in the short to medium term. The 10 Ml/d pump station will later be upgraded to 20 Ml/d and ultimately to 25 Ml/d (the pipeline was designed to accommodate 35 Ml/d) when incorporating the effluent from the Gwaing WWTW. The Reclamation Plant was not used over the last number of years and the Municipality is currently busy with the planning for the refurbishment of the plant, in order to put it back into operation.

Malgas River Pumping Scheme

The Malgas Pumping Scheme was commissioned during 2012 and consists of an off-channel off-take just upstream of the existing Witfontein low level bridge, with a 6.3km 500mm dia. GRP pipeline to the WTW. A pump station was constructed at the offtake. The additional yield from this source is approximately 2 400 Ml.

- The village of Uniondale – ***Uniondale System***

  Bulk water supply to Uniondale is from the Uniondale raw water dam (Capacity of 36 Ml) and from the Kammanassie River, which flows past the town. The town also has an allocation of 0.130 million m³/a from the Haarlem Dam (According to the Appelkloof Water Agreement).

- The village of Haarlem – ***Haarlem System***

  Bulk raw water is supplied to Haarlem from the Haarlem Dam.

The approved 2021/2022 Annual Report of George Municipality list the following Water and Wastewater (Sanitation) challenges.

Table A.3.1: Water and Wastewater (Sanitation) challenges included in the 2021/2022 Annual Report

Water	
Challenge	**Action to Address**
Flooding Events November 2021 / December 2021	Disaster flooding events during 2021 had an extreme impact on the bulk water infrastructure. This created challenges for the Directorate and resulted in more manpower and overtime expenditure.
Blue Drop Accreditation	Various legal and legislative requirements were neglected in the preceding years. The Directorate appointed consultants to assist the George Municipality with the updating of the water safety plans and to perform water treatment plant audits as part of the Blue Drop assessment process as required by the DWS. Many of the Blue Drop requirements are being addressed in-house by the Directorate including various infrastructure audits. The aim is to achieve that maximum possible score during the next assessment period.
Staff Capacity	Currently this Department is understaffed, and filling of vacant positions is slow.
Budget restraints	Adequate budget to address the numerous needs is always a concern.
Expansion of George	The rapid expansion of George results in higher water demand. Peak season adds more stress on the infrastructure capacity.
Load Shedding	Implementation of backup generation and renewable energy at critical infrastructure. The Directorate also applied for exemption from Eskom for the Raw water supply systems which was granted during March / April 2022.
Wastewater	
Flooding Events November 2021 / December 2021	Disaster flooding events during 2021 had an extreme impact on the sewer infrastructure. This created challenges for the Directorate and resulted in more manpower and overtime expenditure.
Improve Green Drop Accreditation	Updates required by DWS had fallen behind. W2RAP updates and process audits on all wastewater treatment plants in progress and will be concluded during the second half of 2022.
Staff Capacity	Currently this Department is understaffed, and filling of vacant positions is slow.
Budget restraints	Sufficient budget is always a concern.
Expansion of George	Expansion of George results in additional effluent generation. Peak season adds more stress on infrastructure capacity with the increased demand.
Load Shedding	Implementation of backup generation and renewable energy at critical infrastructure. The Directorate also applied for exemption from Eskom for the Raw water supply systems which was granted during March / April 2022.

The table below gives an overview of the major water infrastructure components, for the various distribution systems, in George Municipality's Management Area.

A.3.2: Existing main water infrastructure (Resources and WTWs)			
Water Distribution System	**Bulk Supply**	**WTWs and Treatment Processes**	
	(Resources)	**WTW**	**Treatment Processes**
George / Wilderness	Garden Route Dam, Swart River Dam, Malgas River (Weir) and Boreholes Resources currently not in use: Kaaimans River (Weir) and Reclamation Plant	Old George	Three modules: Flow measurement, Coagulant dosing (Soda Ash and U3800 Ultrafloc), Flocculation, Sedimentation, Filtration (Three filters for each module), Stabilization (Soda Ash), Disinfection (Chlorine gas) and Sludge handling.
		New George	Two identical operating modules: Flow measurement, Coagulant dosing (Ferric Chloride, Soda Ash and U3800 Ultrafloc), Flocculation, Sedimentation, Filtration (Three filters for each module), Stabilization (Soda Ash), Disinfection (Chlorine gas) and Sludge handling.
	Touw River (Weir)	Ebb & Flow	Flow measurement, Coagulant dosing (Soda Ash and U3800 Ultrafloc), Flocculation, Sedimentation, Filtration (Three filters), Stabilization (Soda Ash), Disinfection (Chlorine gas) and Sludge handling.
Uniondale	Kammanassie River (Weir) and Uniondale Da	Uniondale	Flow measurement, Coagulant dosing (Soda Ash and U3800 Ultrafloc), Flocculation, Sedimentation, Filtration (Three pressure sand filters), Disinfection (Chlorine gas) and Sludge handling.
Haarlem	Haarlem Dam	Haarlem	Flow measurement, Coagulant dosing (Soda Ash and U3800 Ultrafloc), Flocculation (mixer), Sedimentation, Filtration (Four pressure sand filters), Disinfection (Sodium Hypochlorite) and Sludge handling.

The existing capacities and current flows at each of the WTWs are summarised in the table below.

Table A.3.3: Existing Capacities and Flows at each of the WTWs (Ml/d)						
WTW	**Existing Hydraulic Capacity**	**Peak Month Average Daily Flow**	**Average Daily Flow (Jul 2022 – Jun 2023)**	**Average Daily Flow as a % of Capacity**	**Required Treatment Capacity (1.5 x AADD10yr)**	**2022/2023 Water Quality Failures at WTW (SANS0241:2015)**
Old George	20.000	18.009 (Nov)	15.941	79.71%	65.581	-
New George	20.000	21.817 (Nov)	19.925	99.63%		-
Ebb & Flow	1.700	1.053 (Aug)	0.794	46.71%	1.446	Colour and Turbidity (Operational)
Uniondale	1.500	0.953 (Nov)	0.753	50.20%	1.301	Turbidity (Operational)
Haarlem	1.000	0.808 (Dec)	0.503	50.30%	0.875	Colour, Turbidity (Operational), Free Chlorine, Iron (Aesthetic) and E.Coli

The water reticulation network, water pump stations and reservoirs are summarised in the table below.

A.3.4: Existing water infrastructure (Reticulation, pump stations and reservoirs)					
Water Distribution System	**Water Distribution Networks**	**Number of Water PS**		**Reservoirs and Water Towers**	
		Raw Water	**Potable Water**	**Number of Reservoirs and Water Towers**	**Total Storage in Ml**
	km	**Number of PS**	**Number of PS**		
George / Wilderness	950.077	6	16	29	63.526
Uniondale	32.681	-	2	8	1.200
Haarlem	27.514	-	1	4	2.450

The table below gives an overview of the major sewerage infrastructure components, for the various drainage systems, in George Municipality's Management Area.

A.3.5: Existing sewerage infrastructure					
Sewer System	Hydraulic Capacity	Organic Capacity	WWTW Treatment Processes	Sewer Network	Sewer PS
	Ml/d	kg COD/d		km	Number
Gwaing	7.300	6 935	Biofilter and BNR plant: Automated inlet works and Biofilter plant (Primary sedimentation tanks, biological filters, humus tanks, anaerobic digester, sludge drying beds and maturation ponds), BNR plant (Biological reactor, settling tanks, disinfection) and sludge treatment (Beltpress).	887.443	106
Outeniqua	25.000	25 000	Activated Sludge and BNR plant: Automated inlet works, biological activated sludge reactor, settling tanks, new BNR plant with clarifier, disinfection (chlorine gas) and sludge treatment.		
Kleinkrantz	2.500	2 208	Activated Sludge: Automated inlet works, biological activated sludge reactor, settling tanks, disinfection (chlorine gas) and sludge drying beds.		
Herolds Bay	0.300	210	Oxidation Pond System: Inlet works, two anaerobic ponds, primary and secondary facultative ponds, maturation ponds and infiltration pond.		
Uniondale	1.000	640	Activated Sludge: Automated inlet works, biological activated sludge reactor, settling tanks, disinfection (chlorine gas), sludge drying beds and maturation ponds.	10.999	3
Haarlem	0.100	59	Activated Sludge: Inlet works, septic tank, six reactor tanks, two clarifier tanks, ultraviolet steriliser and three maturation ponds.	3.390	1

The table below gives a summary of the existing hydraulic design capacities and current flows at each of the WWTWs, as well as the final effluent quality compliance percentages for the 2022/2023 financial year (Ml/d).

Table A.3.6: Existing hydraulic design capacities and flows at each of the WWTWs (Ml/d)						
WWTW	Existing Hydraulic Capacity	Peak Month Average Daily Flow	Average Daily Flow (2022/2023)	Average Wet Weather Flow (May'23 and Jun'23)	Average Daily Flow as a % of Design Capacity	Final Effluent Compliance for 2022/2023
Gwaing	7.300	14.392 (Jun)	7.978	13.799	109.29%	Microbiological: 98.0% Chemical: 97.4% Physical: 89.8%
Outeniqua	15.000	18.120 (Jun)	12.241	15.905	81.61%	Microbiological: 53.2% Chemical: 74.5% Physical: 59.6%
Kleinkrantz	2.500	0.912 (Dec)	0.761	0.813	30.44%	Microbiological: 64.0% Chemical: 89.9% Physical: 99.3%
Herolds Bay	0.300	0.274 (Jan)	0.165	0.185	55.00%	Microbiological: 100.0% Chemical: 100.0% Physical: 99.0%
Uniondale	1.000	0.721 (Nov)	0.535	0.482	53.50%	Microbiological: 90.2% Chemical: 100.0% Physical: 99.0%
Haarlem	0.100	Unknown	0.085	Unknown	85.00%	Microbiological: 100.0% Chemical: 100.0% Physical: 100.0%

The organic design capacities of the WWTWs and the current loadings at the WWTWs are indicated in the table below.

Table A.3.7: Existing organic design capacities and historical loadings at the WWTWs

WWTW	Organic Design Capacity (kg COD/d)	2022/2023		2021/2022		2020/2021	
		Average Load (kg COD/d)	% of Design Capacity	Average Load (kg COD/d)	% of Design Capacity	Average Load (kg COD/d)	% of Design Capacity
Gwaing	6 935	3 584	51.68%	3 622	52.23%	3 377	48.70%
Outeniqua	25 000	9 761	39.04%	10 308*	68.72%	8 372*	55.81%
Kleinkrantz	2 208	399	18.07%	414	18.75%	394	17.84%
Herolds Bay	210	51	24.29%	52	24.76%	65	30.95%
Uniondale	640	311	48.59%	389	60.78%	399	62.34%
Haarlem	59	21	34.10%	25	42.95%	29	49.77%

Note: * Organic Design Capacity for the Outeniqua WWTW was 15.000 kg COD/d before the upgrade

The table below gives an overview of the historical population and household figures for George Municipality for the various years.

Table A.3.8: Historical population and household data of George Municipality

Year	Source	Population	Households	Person / Household
2001	Census 2001 Community Profiles	150 000	39 699	3.8
2007	2007 Community Survey	148 021	46 428	3.2
2011	Census 2011 Community Profiles	193 670	53 551	3.6
2016	2016 Community Survey	208 237	62 722	3.3

George Municipality's Spatial Development Framework (SDF), May 2023, estimated the 2022 population at 224 430 persons and the households at 61 179.

George Municipality's 2022 population was estimated at 224 015 persons, according to the Department of Social Development's 2022 projections, as also included in the 2022/2027 IDP. This total population is estimated to increase to 236 737 by 2026, which equates to 1.4% average annual growth over this period.

The 2022/2023 populations for the various distribution system were estimated by applying the annual growth rates as indicated in the table below. The current population figures and the annual population growth percentages used in the WSDP Performance- and Water Services Audit Report are aligned with the figures used in DWS's GeoDatabase. The future estimated annual population growth percentages, as listed in the table below, were agreed with the Municipality during January 2014.

Table A.3.9: Annual population growth percentages, population and households per distribution system

Town	Estimated future annual Population Growth %	Projected 2022/2023 Population	Projected 2022/2023 Households
George / Wilderness	2.80%	223 254	62 915
Uniondale	2.50%	5 937	1 467
Haarlem	1.00%	2 651	666
Farms	2.00%	27 359	6 718
Total	**2.68%**	**259 201**	**71 765**

The current population in the WSDP and Water Services Audit Report is estimated higher than the estimated population figures included in the SDF and the IDP. The estimated average annual future population growth percentage is also estimated higher.

The tables below give an overview of the projected population and permanent number of households and the water and sanitation service levels in George Municipality's Management Area.

Table A.3.10: Water Services Overview (Water)

Settlement Type	2011/2012 Households	2011/2012 Population	2022/2023 Households	2022/2023 Population	Water category: Adequate: Formal	Adequate: Informal	Adequate: Shared Services	Water resources needs only	O&M needs only	Infrastructure needs only	Infrastructure & O&M needs	Infrastructure, O&M & Resource need	No Services: Informal	No Services: Formal
URBAN														
Metropolitan Area					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Formal Town					Adequate			Below RDP					None	
George and Wilderness	42 211	147 881	54 225	188 494	P		P							
Uniondale	1 094	4 429	1 445	5 849	P		P							
Haarlem	597	2 376	648	2 579	P		P							
Sub-Total	**43 902**	**154 686**	**56 318**	**196 922**										
Townships					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Informal Settlements					Adequate			Below RDP					None	
George and Wilderness	4 222	16 888	8 690	34 760		P							P	
Uniondale	24	96	22	88		P								
Haarlem			18	72									P	
Sub-Total	**4 246**	**16 984**	**8 730**	**34 920**										
Working towns & service centres					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Sub-Total: (Urban)	**48 148**	**171 670**	**65 048**	**231 842**										
RURAL														
Rural / Farming					Adequate			Below RDP					None	
Farms	5 186	21 136	6 490	26 447	P		P							P
Sub-Total	**5 186**	**21 136**	**6 490**	**26 447**										
Informal Settlements					Adequate			Below RDP					None	
Farms	217	868	228	912		P							P	
Sub-Total	**217**	**868**	**228**	**912**										
Sub-Total (Rural)	**5 403**	**22 004**	**6 718**	**27 359**										
TOTAL	**53 551**	**193 674**	**71 766**	**259 201**										

Table A.3.11: Water Services Overview (Sanitation)															
	2011/2012		2022/2023		Sanitation category										
Settlement Type	Households	Population	Households	Population	Adequate: Formal	Adequate: Informal	Adequate: Sahred Services	Water resources needs only	O&M needs only	Infrastructure needs only	Infrastructure & O&M needs	Infrastructure, O&M & Resource need	No Services: Informal	No Services: Formal
URBAN															
Metropolitan Area					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**											
Formal Town					Adequate			Below RDP					None	
George and Wilderness	42 211	147 881	54 225	188 494	P		P								
Uniondale	1 094	4 429	1 445	5 849	P		P								
Haarlem	597	2 376	648	2 579	P		P								
Sub-Total	**43 902**	**154 686**	**56 318**	**196 922**											
Townships					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**											
Informal Settlements					Adequate			Below RDP					None	
George and Wilderness	4 222	16 888	8 690	34 760		P							P		
Uniondale	24	96	22	88		P									
Haarlem			18	72		P									
Sub-Total	**4 246**	**16 984**	**8 730**	**34 920**											
Working towns & service centres					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**											
Sub-Total: (Urban)	**48 148**	**171 670**	**65 048**	**231 842**											
RURAL															
Rural / Farming					Adequate			Below RDP					None	
Farms	5 186	21 136	6 490	26 447	P		P							P	
Sub-Total	**5 186**	**21 136**	**6 490**	**26 447**											
Informal Settlements					Adequate			Below RDP					None	
Farms	217	868	228	912		P							P		
Sub-Total	**217**	**868**	**228**	**912**											
Sub-Total (Rural)	**5 403**	**22 004**	**6 718**	**27 359**											
TOTAL	**53 551**	**193 674**	**71 766**	**259 201**											

B. WSDP PERFORMANCE REPORT

B.1. WSDP Reference and Status

George Municipality updated their 2013/2014 WSDP during the 2019/2020 financial year, according to DWS's new WSDP guidelines. The draft WSDP documents were submitted to the DWS, DLG and the neighbouring WSAs for their comments during January 2020. No comments were received and the WSDP documents were therefore finalised. The final WSDP was approved by Council with the IDP. The table below gives an overview of the Municipality's WSDP status.

Table B.1.1: WSDP and Reporting Reference

Nr	WSDP Title and Reference	Status	Date	WSDP Year	Financial Year	Reporting year
1	Water Services Development Plan 2017-2022, WSDP website and other documents	Draft:	December 2019	Year 1	2018/2019	Year -4
		Comment submit:	February 2020	Year 2	2019/2020	Year -3
		Finalised:	June 2020	Year 3	2020/2021	Year -2
		Adopted:	With IDP	Year 4	2021/2022	Year -1
		Published:	With IDP	**Year 5**	**2022/2023**	**Year 0**

Legend:

- Past Financial Years
- Previous Financial Year (financial year of reporting)
- Future Years

B.2. Performance on Water Services Objectives and Strategies

The IDP is the Municipality's single most strategic document that drives and directs all implementation and related processes. The Municipality's budget is developed based on the priorities, programmes and projects of the IDP, after which a Service Delivery and Budget Implementation Plan (SDBIP) is developed, to ensure that the organisation actually delivers on the IDP targets.

The SDBIP is the process plan and performance indicator / evaluation for the execution of the budget. The SDBIP is being used as a management, implementation and monitoring tool that assists and guide the Executive Mayor, Councillors, Municipal Manager, Senior Managers and the community. The plan serves as an input to the performance agreements of the Municipal Manager and Directors. It also forms the basis for the monthly, quarterly, mid-year and the annual assessment report and performance assessments of the Municipal Manager and Directors.

Finally, the Annual Report, of which the Water Services Audit Report forms a part, records the success or otherwise of the previous year's implementation.

The table below gives an overview of the Municipality's performance on the water and sanitation objectives and strategies (KPIs) per WSDP topic.

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic

KPI Ref	Objective / Strategy	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		**WSDP Year 5**	
					FY 1	2018/19	FY 2	2019/20	FY 3	2020/21	FY 4	2021/22	FY 5	2022/23
			WSDP	**IDP**	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
WSDP Topic 1: Administration														
WSDP Topic 2: Demographics														
WSDP Topic 3: Service levels														
D1195	Install new water connections within 10 working days of application received by Department	% of connections installed within the required timeframe	No	Yes	90%	60%	90%	60%	90%	66%	90%	57%	90%	62.67%
D1152	Install new sewerage connections within 12 days of application received by Department	% of connections within the required timeframe	No	Yes	90%	97%	90%	100%	90%	92%	-	-	90%	91.67%
WSDP Topic 4: Socio economic														
WSDP Topic 5: Water Services Infrastructure														
D1201	Spend 95% of the capital budget of Water Services projects by 30 June - Water Distribution	% capital budget spent	Yes	Yes	85%	51%	85%	37%	85%	51%	95%	95%	95%	90%
D1219	Spend 95% of the capital budget of Water Treatment Services projects by 30 June - Water Treatment	% capital budget spent	Yes	Yes	85%	53%	85%	56%	85%	54%	95%	95%	95%	95%
	Spend % of the approved capital budget on the rehabilitation and upgrade the Sewerage Networks by 30 June.	% of budget spend at 30 June	-	-	85%	40%	85%	43%	85%	82%	-	-	-	-
D1155	Spend 95% of the capital budget of Sewer Network projects by 30 June	% of capital budget spent	Yes	Yes	-	-	-	-	-	-	-	-	95%	95%
D1176	Spend 95% of the capital budget of the Waste Water Treatment Services projects by 30 June	% of capital budget spent	Yes	Yes	85%	96%	85%	24%	85%	65%	95%	95%	95%	95%
	Spend 95% of the sub-directorate Water and Waste Water Services capital budget by 30 June	% capital budget spent	-	-	-	-	-	-	-	-	95%	91%	-	-
	% Spent by 30 June of the amount budgeted for the construction of the raising of the Garden Route Dam spill way.	% of approved budget spend at 30 June	-	-	85%	90%	85%	98.1%	-	-	-	-	-	-
WSDP Topic 6: Operation Maintenance														
D1175	90% of test results of outflow water complying with permit values	% of test results within permit values	Yes	Yes	90%	92%	90%	92%	90%	96%	90%	90%	90%	89.33%
	Obtain 95% water quality level as per SANS 241 physical and micro parameters by 30 June.	% water quality level obtained as measured against the SANS241:2015 physical and micro parameters	-	-	95%	99%	95%	98%	95%	98%	-	-	-	-
	Ensure that SHE representatives of the sub-directorate submits monthly inspection reports w.r.t Health and Safety to the Deputy Director for sign-off on or before the 13th of each month (Water Services).	% of inspection reports submitted to the Director, to ensure the safety of all personnel and to protect the municipality from legal actions.	-	-	12	7	12	12	12	12	-	-	-	-
	Ensure that SHE representatives of the sub-directorate submits monthly inspection reports w.r.t Health and Safety to the Deputy Director for sign-off on or before the 13th of each month. (Sanitation Services)	% of inspection reports submitted to the Director, to ensure the safety of all personnel and to protect the municipality from legal actions.	-	-	12	7	12	12	12	12	-	-	-	-
WSDP Topic 7: Associated services														

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic

KPI Ref	Objective / Strategy	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		WSDP Year 5	
					FY 1	2018/19	FY 2	2019/20	FY 3	2020/21	FY 4	2021/22	FY 5	2022/23
			WSDP	IDP	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
WSDP Topic 8: Conservation and Demand management														
D1196	Repair pipe bursts within 24 hours from when reported	% repaired within the required timeframe	No	Yes	90%	98%	90%	97%	90%	89%	90%	73%	90%	90%
	Limit water network losses to less than 25% by 30 June.	% Water network losses by 30 June	-	-	25%	11%	25%	Not Available	25%	23%	-	-	-	-
	Compile a strategy and implementation plan for the roll-out of the installation of smart water meters by March 2022	Strategy and implementation Plan developed	-	-	-	-	-	-	-	-	1	1	-	-
	Develop a water tariff model (taking into account maintenance needs, ageing and new infrastructure, depreciation and interest on loans)	Water tariff model developed	-	-	-	-	-	-	-	-	1	0	-	-
	Develop a bulk water meter installation per suburb plan by end December 2021	Plan developed	-	-	-	-	-	-	-	-	1	0	-	-
D1197	Install bulk water meters per informal settlement	Number of bulk water meters installed per informal settlement	No	Yes	-	-	-	-	-	-	5	0	5	5
	Install bulk water meters per suburb in terms of the Bulk Water Meter Installion Plan	% of bulk water meters installed	-	-	-	-	-	-	-	-	90%	90%	-	-
D1199	Communicate 100% of planned interruptions in water supply to consumers at least 2 days prior to the interruption	% of planned interruptions communicated at least 7 days prior to the interruption	No	Yes	-	-	-	-	-	-	90%	61%	100%	100.0%
D1198	Implement Phase 1 of a pressure management implementation programme for the water networks by 30 June 2023	% completed	No	Yes	-	-	-	-	-	-	-	-	100%	100.0%
WSDP Topic 9: Water Resources														
WSDP Topic 10: Financial profile														
D1154	Spend 90% of the waste water maintenance (excluding general vehicles-sewerage network & general vehicles sewerage administration) budget by 30 June	% of the maintenance budget spent	Yes	Yes	-	-	-	-	-	-	-	-	90%	90%
D1174	Spend 90% of the waste water treatment maintenance (excluding general vehicles-sewerage network & general vehicles sewerage administration) budget by 30 June	% of the maintenance budget spent	Yes	Yes	-	-	-	-	-	-	-	-	90%	90%
D1200	Spend 90% of the water maintenance (excluding general vehicles-water purification, general vehicles-irrigation water & vehicle costs-water dams) budget by 30 June	% of the maintenance budget spent	Yes	Yes	-	-	-	-	-	-	-	-	90%	90%
D1218	Spend 90% of the water treatment maintenance (excluding general vehicles-sewerage network & general vehicles sewerage administration) budget by 30 June	% of the maintenance budget spent	Yes	Yes	-	-	-	-	-	-	-	-	90%	90%
WSDP Topic 11: Institutional Arrangements profile														
	Annual completion of the Regulatory Performance Measurement System by the end of June	% completed	-	-	-	-	-	-	-	-	-	-	-	-
	Submit the Water Services Audit Report by the 31st of October in terms of Section 18(1) of the Water Services Act.	Report submitted	-	-	1	1	1	1	1	0	1	0	-	-
WSDP Topic 12: Social and Customer service requirements														
D1153	Clear sewerage blockages within 48 hours from when reported	% repaired within the required timeframe	No	Yes	90%	97%	90%	100%	90%	100%	-	-	90%	76.67%
	Complete 95% of matters allocated on collaborator (other than service delivery complaints) within 10 days - Water and Waste Water Services	% of matters allocated on collaborator completed within 10 days	-	-	-	-	-	-	-	-	95%	82%	-	-
D1208	Complete 95% of matters allocated on collaborator (other than service delivery complaints) within the required timeframe - Water Treatment	% of matters allocated on collaborator completed within the required timeframe	No	Yes	-	-	-	-	-	-	95%	97%	95%	95.42%
D1185	Complete 95% of matters allocated on collaborator (other than service delivery complaints) within the required timeframe - Water Distribution	% of matters allocated on collaborator completed within the required timeframe	No	Yes	-	-	-	-	-	-	95%	62%	95%	79.17%
D1142	Complete 95% of matters allocated on collaborator (other than service delivery complaints) within the required timeframe - Waste Water Collection and Conveyance)	% of matters allocated on collaborator completed within the required timeframe	No	Yes	-	-	-	-	-	-	-	-	95%	79.71%
D1164	Complete 95% of matters allocated on collaborator (other than service delivery complaints) within the required timeframe - Waste Water Treatment	% of matters allocated on collaborator completed within the required timeframe	No	Yes	-	-	-	-	-	-	95%	97%	95%	95.00%
D1163	Complete 95% of service delivery complaints within the timeframe as specified in the Service Charter (Waste Water Treatment)	% of complaints attended to	No	Yes	-	-	-	-	-	-	-	-	95%	95.00%
D1184	Complete 95% of service delivery complaints within the timeframe as specified in the Service Charter (Water Distribution)	% of complaints attended to	No	Yes	-	-	-	-	-	-	-	-	95%	86.17%
WSDP Topic 13: Needs development plan														

The following water and sanitation related investigations were successfully completed during the last financial year.

- The Water Services Audit Report for 2021/2022 was finalised and approved by Council as part of the Annual Report. The NRW water balance models were updated for each of the distribution systems (Up to the end of June 2022) as part of the Water Services Audit Process.

- George Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). Sample results are loaded on a monthly basis onto DWS's IRIS. All the WTWs and WWTWs are also registered on the IRIS website. The effluent discharged by the industrial consumers is also monitored by George Municipality on a monthly basis.

- The Water and Sewer Master Plans for the various distribution and drainage systems are updated on a quarterly basis. The Water and Sewer Master Plans are also worked through with the personnel of the Civil Engineering Services Directorate.

- The Asset Register was updated to include all the water and sewerage capital projects completed during the 2022/2023 financial year.

- The following Water Safety Plans were compiled:
  - Water Safety Plan for George and Wilderness;
  - Water Safety Plan for Uniondale; and
  - Water Safety Plan for Haarlem.

- The following Wastewater Risk Abatement Plans (W_2RAPs) were compiled:
  - W_2RAP for Outeniqua WWTW and Drainage Network;
  - W_2RAP for Gwaing WWTW and Drainage Network;
  - W_2RAP for Herolds Bay WWTW and Drainage Network;
  - W_2RAP for Kleinkrantz WWTW and Drainage Network;
  - W_2RAP for Uniondale WWTW and Drainage Network; and
  - W_2RAP for Kleinkrantz WWTW and Drainage Network.

- Detail WTW Process Audits were completed for the Old George WTW, New George WTW, Wilderness WTW, Uniondale WTW and Haarlem WTW.

- Detail WWTW Process Audits were completed for the Outeniqua WWTW, Gwaing WWTW, Herolds Bay WWTW, Kleinkrantz WWTW, Uniondale WWTW and Haarlem WWTW.

- The following Technical Reports were completed during the last financial year:
  - A Design Report was completed for the Replacement of the Kaaimans Raw Water Pumps and Minor Electrical Works, Zutari, Revision 0, 14 March 2022.
  - A Design Report was completed for a New 30Ml Raw Water Balancing Dam and Associated Works, Zutari, Revision 0, 11 July 2022.
  - An Inception Report was completed for the Upgrading of Herolds Bay Sewer Pump Station No 1, George, SMEC, Revision 1, 13 January 2023.
  - A Detailed Design Report was completed for the Upgrading of the Industrial Water Pipeline, George, SMEC, 13 January 2023.

- A Draft Design Report was completed for the Upgrading of Thembalethu No. 6 Sewer Pumps Station SMEC, 31 January 2023.
- A Desing Report was completed for the Parkdene Water Reticulation Upgrading Phase 2, Lukhozi Consulting Engineers, Revision No. 1, 2 March 2023.
- A Preliminary Design Report was completed for the Pacaltsdorp Bulk Water Supply – New 14.5Ml Capacity Reservoir, Royal HaskoningDHV, 30 March 2023.
- A Preliminary Design Report was completed for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Pacaltsdorp Pump Station No.3 and Rising Main and Abandonment of Pump Station No.6: Portion 2: Civil, Structural, Mechanical & Electrical Upgrades of Pump Station, Lyners, Revision 1, May 2023.
- A Concept and Viability Report was compiled for the Upgrading of Eden Pumpstation and Associated Infrastructure Phase 2, Lukhozi Consulting Engineers, Revision 1, 8 May 2023.
- A Preliminary Design Report was completed for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Pacaltsdorp Pump Station No.3 and Rising Main and Abandonment of Pump Station No.6: Portion 1: Pump Station No. 3 Rising Main and Abandonment of Pump Station No. 6 with Associated Gravity Pipeline, Lyners, Revision 3, June 2023.
- A Detailed Design Report was completed for the Upgrading of Meul Pumpstation – Phase 2, Portion 1: Rising Main & Civil Infrastructure, Lyners, Revision 3, June 2023.
- A Preliminary Design Report was completed for the New Pacaltsdorp (East) Reservoir, Water Tower Pumpstation and Associated Works, Zutari, Revision 2, 1 June 2023.
- A Preliminary Design Report was compiled for the Rehabilitation / Upgrading of Sewer Network and Associated Bulk Facilities – Upgrading of Schaapkop Pumpstation and Associated Infrastructure Phase, CL Consult, 5 June 2023.
- A Condition Assessment and Implementation Options Report was completed for the Outeniqua Wastewater Treatment Works – Ultra Filtration Plant, WEC, Revision 02, 20 June 2023.

- The following WSIG Project Business Plans were compiled and submitted to the DWS for potential future funding:
  - Herolds Bay Sanitation Pump Station No.1 and Rising Main Upgrade, 18 July 2022.
  - Extension of the Gwaiing Wastewater Treatment Works: Phase 1B, 11 July 2022.
  - Parkdene Water Reticulation Rehabilitation: Phase 2, 11 July 2022.
  - Upgrading of Thembalethu UISP Bulk Sewer Mains: Phase 4 (Old All Brick Area), 19 July 2022.

The Municipality also received the following awards / acknowledgements:

- **George Municipality's performed well with regard to DWS's 2021 Blue Drop Progress Assessment (Drinking Water Process and Quality). The Blue Drop Risk Ratings for all four systems were in the low-risk category (<50%).** The risk ratings were determined based on the following system specific risk indicators.
  - Design capacity;
  - Operational capacity;
  - Water Quality Compliance;
  - Technical Skills; and
  - Water Safety Plans.

- **George Municipality is also performing good with regard to wastewater quality management, with an overall Green Drop Score of 74% for DWS's 2021 assessment.** The Green Drop Scores for the six WWTWs and drainage systems were between 64% and 80%. The Wastewater Risk Ratings were at low risk (<50%) for all six WWTWs and drainage systems.

B.3. Status of Water Services Projects

George Municipality continued with the following key water and sewerage capital infrastructure projects during the 2022/2023 financial year (Projects with expenditure above R1 million for the last financial year).

- The extension of the New George WTW with an additional 20 Ml/d treatment capacity and the rehabilitation of the Old George WTW (6 Ml/d Module). Generators were purchased and installed at some of the WTWs, in order to provide power during load shedding periods. Filter sand was purchased for the WTWs. Depot facilities were upgraded.
- New extractor fans were installed for the chlorine buildings at the WTWs.
- Generators were purchased and installed for the Garden Route Dam Raw Water Pump Station. The Garden Route dam suction pipework rehabilitation also commenced.
- New fences were installed at some of the WTWs and Reservoirs, in order to prevent theft and vandalism and illegal access to the sites.
- Installation of Smart water meters to monitor water usage more effectively and to reduce NRW and Water Losses commenced. The Municipality also continued with the installation of additional bulk water meters.
- Designs were started for the construction of the new 14.5 Ml reservoir and 2.4 Ml water tower for Pacaltsdorp and the new Thembalethu (East) reservoir, water tower and pump station.
- Designs were started for the construction of the additional raw water balancing dams for George.
- Various sections of the water reticulation networks and sewer drainage networks and pump stations were upgraded as recommended in the Water and Sewer Master Plans. Sections of the old water reticulation networks and sewer drainage networks were also replaced (Implementation of the Pipeline Replacement Programmes).
- The Municipality continued with the designs for the upgrading of the Meul Street, Schaapkop and Thembalethu 6 sewer pump stations. Electrical switch gear was also upgraded at some of the sewer pump stations.
- Designs commenced for the upgrade of the Pacaltsdorp pump station 3 and Eden sewer pump stations.
- The Municipality is busy with the planning and design for the extensions at the Gwaing WWTW with a further 10Ml/day, and the implementation of the additional 3.5 Ml/d capacity. The current capacity of the plant is increased to 11Ml/day.
- The municipality continued with the additional 10 Ml/d Outeniqua WWTW extension, which included odour control.
- New fencing were installed at the Outeniqua and Gwaing WWTW, in order to prevent theft and vandalism and illegal access to the WWTWs.
- Designs were finalised for the implementation of the Kleinkrantz sludge dewatering plant.
- Flood damage at the Outeniqua WWTWs commenced.
- Additional Honey Sucker trucks were purchased for the sewer pump stations and for the emptying of tanks.

Table B.3.1: Water Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Project Progress (%)	Year 0 Performance - FY2022/23			Funding Source(s) for 2022/2023	Project Category / Type	Planned Period		Project Status	Actual Completion Year
		WSDP	IDP			FY Budget R'000	Expended R'000	%			From FY	To FY		
1	Dam Safety Construction	No	Yes	R746	100.0%	R415	R125	30%	Own Funding	Water	2018/2019	2022/2023	Completed	2022/2023
2	Uniondale Reservoir (500Kl)	Yes	Yes	R14 153	8.1%	R498	R391	79%	Own Funding and Loans	Water	2019/2020	2024/2025	In Progress	-
3	Pacaltsdorp 14.5Ml Reservior and 2.4Ml Water Tower	Yes	Yes	R81 384	2.9%	R1 371	R1 371	100%	RBIG	Water	2020/2021	2024/2025	In Progress	-
4	Filter Sand At Waterworks	Yes	Yes	R43 571	51.5%	R11 505	R11 505	100%	RBIG	Water	2018/2019	2023/2024	In Progress	-
5	Extension Of Waterworks 20Ml	Yes	Yes	R298 342	55.4%	R229 159	R114 109	50%	Loans, Own Funding, RBIG	Water	2018/2019	2024/2025	In Progress	-
6	Uniondale Waterworks Office Building (Process Controllers)	Yes	Yes	R2 605	100.0%	R1 820	R1 750	96%	Loans, Own Funding	Water	2019/2020	2022/2023	Completed	2022/2023
7	Kaaimans Water Pump Station Rehabilitation	Yes	Yes	R17 162	6.8%	R832	R832	100%	RBIG	Water	2019/2020	2023/2024	In Progress	-
8	Fence at Old Waterworks	No	Yes	R400	100.0%	R1	R0	0%	Own Funding	Water	2020/2021	2020/2021	Completed	2020/2021
9	Haarlem Waterworks Office Building	Yes	Yes	R1 213	100.0%	R1 238	R1 213	98%	Loans, Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
10	Telemetry - Water Purification	Yes	Yes	R3 468	63.7%	R766	R766	100%	Own Funding	Water	2020/2021	2025/2026	In Progress	-
11	Extractor Fans - Chlorine Rooms	Yes	Yes	R19 449	42.6%	R7 409	R7 409	100%	RBIG	Water	2021/2022	2023/2024	In Progress	-
12	Network Rehabilitation - Water	Yes	Yes	R55 030	42.2%	R17 984	R14 409	80%	Loans, Own Funding, MDRG	Water	2018/2019	2025/2026	In Progress	-
13	Upgrading Of Asbestos Pipes - Greater George	Yes	Yes	R5 504	91.8%	R2 119	R2 013	95%	Own Funding	Water	2019/2020	2024/2025	In Progress	-
14	Airport Mainline Upgrade	Yes	Yes	R20 807	3.9%	R1 100	R579	53%	Loans	Water	2020/2021	2024/2025	In Progress	-
15	N2 Thembalethu Crossing Upgrade	Yes	Yes	R618	100.0%	R165	R165	100%	Own Funding	Water	2019/2020	2022/2023	Completed	2022/2023
16	Upgrading Depot Faclities	Yes	Yes	R6 963	94.8%	R5 225	R5 074	97%	Loans, Own Funding	Water	2019/2020	2024/2025	In Progress	-
17	Industrial Water Pipeline Re-Alignment	No	Yes	R1 246	35.8%	R1 081	R446	41%	Loans, Own Funding	Water	2022/2023	2023/2024	In Progress	-
18	Installation Of New Meters - Water Distribution	Yes	Yes	R4 521	66.8%	R421	R420	100%	Own Funding	Water	2019/2020	2024/2025	In Progress	-
19	Telemetry And Loggers - Water Distribution	Yes	Yes	R2 282	44.8%	R361	R361	100%	Own Funding	Water	2020/2021	2025/2026	In Progress	-
20	Tools And Equipment - Water Distribution	Yes	Yes	R917	34.6%	R181	R108	59%	Own Funding	Water	2018/2019	2025/2026	In Progress	-
21	Bakkies: Water Distribution	Yes	Yes	R3 242	56.8%	R1 843	R1 842	100%	Loans	Water	2022/2023	2024/2025	In Progress	-
22	Water Trucks	Yes	Yes	R2 968	100.0%	R2 107	R2 102	100%	Loans	Water	2021/2022	2022/2023	Completed	2022/2023
23	Intallation of Bulk Meters	Yes	Yes	R22 987	42.1%	R5 990	R5 988	100%	Loans	Water	2021/2022	2025/2026	In Progress	-
24	Tools and Equipment - Water Purification	Yes	Yes	R701	14.4%	R79	R79	100%	Own Funding	Water	2021/2022	2025/2026	In Progress	-
25	Pipework Rehabilitation: Garden Route Dam	No	Yes	R31 993	6.3%	R2 021	R1 521	75%	RBIG, Loans	Water	2021/2022	2024/2025	In Progress	-
26	Thembalethu (East) Reservoir, Tower and Pump Station	Yes	Yes	R59 808	6.4%	R3 081	R3 081	100%	RBIG	Water	2021/2022	2024/2025	In Progress	-
27	Pacaltsdorp (East) Reservoir, Tower and Pump Station	Yes	Yes	R36 520	4.2%	R800	R800	100%	RBIG	Water	2021/2022	2024/2025	In Progress	-
28	Balancing Dam	No	Yes	R44 972	5.9%	R1 827	R1 827	100%	RBIG	Water	2021/2022	2024/2025	In Progress	-
29	Thembalethu Pumpstation and 6Ml Reservoir	Yes	Yes	R25 821	3.2%	R478	R478	100%	RBIG	Water	2021/2022	2024/2025	In Progress	-
30	Rehabilitation of Old WTW (6Ml Module)	Yes	Yes	R25 572	100.0%	R20 447	R20 447	100%	RBIG	Water	2021/2022	2022/2023	Completed	2022/2023
31	Generator - Garden Route Dam Pumpstation	No	Yes	R13 920	99.6%	R13 591	R13 591	100%	RBIG	Water	2021/2022	2023/2024	In Progress	-
32	Furniture and Office Equipment - Water Purification	No	Yes	R141	100.0%	R133	R133	100%	Own Funding	Water	2021/2022	2022/2023	Completed	2022/2023
33	Fence at WTW	Yes	Yes	R9 243	62.1%	R4 855	R4 855	100%	RBIG	Water	2021/2022	2023/2024	In Progress	-

Note: Total Project Cost: Actual expenditure from 2018/2019 to 2022/2023 plus approved budgets for period 2023/2024 to 2025/2026

Table B.3.1: Water Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Project Progress (%)	Year 0 Performance - FY2022/23			Funding Source(s) for 2022/2023	Project Category / Type	Planned Period		Project Status	Actual Completion Year
		WSDP	IDP			FY Budget R'000	Expended R'000	%			From FY	To FY		
34	Property Development - Sweatpea Street Residential	Yes	Yes	R517	0.0%	R75	R0	0%	Own Funding	Water	2022/2023	2022/2023	Not implemented	-
35	Two-Way Radio Systems	Yes	Yes	R432	30.6%	R132	R132	100%	Own Funding	Water	2022/2023	2025/2026	In Progress	-
36	Provision of Water Tanks	Yes	Yes	R313	4.1%	R20	R13	64%	Own Funding	Water	2022/2023	2025/2026	In Progress	-
37	Trailers for Tools and Equipment	Yes	Yes	R679	22.7%	R200	R154	77%	Own Funding	Water	2022/2023	2025/2026	In Progress	-
38	Pressure Reducing Valves	Yes	Yes	R14 602	5.5%	R1 000	R802	80%	Own Funding	Water	2022/2023	2025/2026	In Progress	-
39	Swart River Dam Safety Construction (MDGR)	No	Yes	R2 407	0.3%	R4 087	R7	0%	MDRG, Own Funding	Water	2022/2023	2024/2025	In Progress	-
40	Swart River Dam Access Phase 2 (MDRG)	No	Yes	R0	0.0%	R6 991	R0	0%	MDRG	Water	2022/2023	2022/2023	Not implemented	-
41	Water Treatment Works-Flooding (MDRG)	No	Yes	R0	0.0%	R2 890	R0	0%	MDRG	Water	2022/2023	2022/2023	Not implemented	-
42	Uniondale Water Network Rehabilitation	Yes	Yes	R1 293	100.0%	R1 500	R1 293	86%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
43	Installation of Smart Meters	Yes	Yes	R83 056	27.8%	R25 700	R23 056	90%	Loans	Water	2022/2023	2025/2026	In Progress	-
44	Installation of New Water Connections	Yes	Yes	R3 257	26.3%	R943	R857	91%	Own Funding	Water	2022/2023	2025/2026	In Progress	-
45	Installation of Burst Control Valves	No	Yes	R3 500	14.3%	R500	R500	100%	Own Funding	Water	2022/2023	2024/2025	In Progress	-
46	Upgrading of Security at Facilities	Yes	Yes	R0	0.0%	R239	R0	0%	Own Funding	Water	2022/2023	2022/2023	Not implemented	-
47	Leak Detector - Water	Yes	Yes	R300	100.0%	R300	R300	100%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
48	Clamp on Flow Meters for Leak Detectors	Yes	Yes	R192	100.0%	R193	R192	100%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
49	Inspection Camera	Yes	Yes	R350	42.9%	R150	R150	100%	Own Funding	Water	2022/2023	2023/2024	In Progress	-
50	CCTV Cameras - Water Facilities (EFF)	No	Yes	R441	100.0%	R500	R441	88%	Loans	Water	2022/2023	2022/2023	Completed	2022/2023
51	Upgrading of Conville Water: Phase 1 & 2 (MIG)	Yes	Yes	R23 084	17.7%	R4 848	R4 078	84%	Own Funding, IUDG	Water	2022/2023	2024/2025	In Progress	-
52	Malgas Water Pump Station Rehabilitation	Yes	Yes	R77	100.0%	R77	R77	100%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
53	Generators - Water Purification	Yes	Yes	R1 940	100.0%	R4 474	R1 940	43%	Own Funding, Emergengy Municipal Load-Shedding Relief Grant	Water	2022/2023	2022/2023	Completed	2022/2023
54	Fencing at Reservoirs	Yes	Yes	R3 065	51.1%	R1 567	R1 565	100%	Loans	Water	2022/2023	2023/2024	In Progress	-
55	Fencing at Uniondale and Haarlem WTW	Yes	Yes	R871	100.0%	R873	R871	100%	Loans	Water	2022/2023	2022/2023	Completed	2022/2023
56	George New WTW - Handrails	No	Yes	R0	0.0%	R47	R0	0%	Own Funding	Water	2022/2023	2022/2023	Not implemented	-
57	All Water Pump Stations (Spectrum) Pepperspray	No	Yes	R657	61.9%	R407	R407	100%	Own Funding	Water	2022/2023	2023/2024	In Progress	-
58	Wilderness Waterworks	No	Yes	R670	100.0%	R670	R670	100%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
59	Borehole Safety Enclosures	No	Yes	R168	100.0%	R170	R168	99%	Own Funding	Water	2022/2023	2022/2023	Completed	2022/2023
Total Water				**R1 000 141**		**R399 457**	**R257 462**	**64%**						

Note: Total Project Cost: Actual expenditure from 2018/2019 to 2022/2023 plus approved budgets for period 2023/2024 to 2025/2026

Table B.3.2: Sewerage Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Project Progress (%)	Year 0 Performance - FY2022/23			Funding Source(s) for 2022/2023	Project Category / Type	Planned Period		Project Status	Actual Completion Year
		WSDP	IDP			FY Budget R'000	Expended R'000	%			From FY	To FY		
1	Wilderness Kleinkrantz Main Sewer Line Upgrade	Yes	Yes	R4 563	14.5%	R2 652	R129	5%	Loans	Sewer	2019/2020	2023/2024	In Progress	-
2	Telemetry And Service Network System	Yes	Yes	R2 908	48.4%	R600	R581	97%	Own Funding	Sewer	2020/2021	2025/2026	In Progress	-
3	Upgrade Electrical Switch Gear At Sewer Pump Stations	Yes	Yes	R12 374	41.8%	R2 400	R2 127	89%	Loans	Sewer	2018/2019	2025/2026	In Progress	-
4	Upgrade Pumpstations - Sewer	Yes	Yes	R63 843	23.9%	R8 919	R7 530	84%	Loans, Own Funding	Sewer	2018/2019	2025/2026	In Progress	-
5	Sewerage Network Rehabilitation	Yes	Yes	R43 206	41.0%	R7 154	R7 143	100%	Loans, Own Funding	Sewer	2018/2019	2025/2026	In Progress	-
6	Upgrading Of Meul Street Pumpstation	Yes	Yes	R80 165	40.1%	R23 902	R23 902	100%	RBIG	Sewer	2019/2020	2024/2025	In Progress	-
7	Schaapkop Pumpstation (Install Inlet Screens)	Yes	Yes	R61 050	18.8%	R2 926	R2 791	95%	RBIG, Own Funding	Sewer	2020/2021	2024/2025	In Progress	-
8	Honey Suckers Trucks For Pumpstations	Yes	Yes	R5 743	100.0%	R5 808	R4 849	83%	Loans, Own Funding	Sewer	2021/2022	2022/2023	Completed	2022/2023
9	Thembalethu UISP Bulk	Yes	Yes	R75 818	5.8%	R3 471	R1 656	48%	Own Funding, Loans, WSIG, IUDG	Sewer	2020/2021	2025/2026	In Progress	
10	Outeniqua 10Ml Addition - WWTW	Yes	Yes	R121 712	100.0%	R18 160	R15 957	88%	Loans, Own Funding	Sewer	2018/2019	2023/2024	In Progress	-
11	Gwaiing Sewer Treatment - Reinstate 3.5Ml	Yes	Yes	R18 651	100.0%	R18 250	R14 159	78%	Loans	Sewer	2018/2019	2022/2023	Completed	2022/2023
12	Furniture And Fittings - Laboratory	Yes	Yes	R650	26.9%	R50	R46	92%	Own Funding	Sewer	2018/2019	2024/2025	In Progress	-
13	Furniture And Fittings - Water Contamination Control	Yes	Yes	R170	100.0%	R70	R70	100%	Own Funding	Sewer	2018/2019	2022/2023	Completed	2022/2023
14	Refurbishment Of Belt Presses At Gwaiing WWTW	Yes	Yes	R1 721	62.8%	R268	R267	100%	Own Funding	Sewer	2018/2019	2024/2025	In Progress	-
15	Laboratory Instruments - WWTW	Yes	Yes	R3 358	16.6%	R22	R21	94%	Own Funding	Sewer	2018/2019	2025/2026	In Progress	-
16	Tools And Equipment - WWTW	Yes	Yes	R333	33.9%	R47	R47	100%	Own Funding	Sewer	2018/2019	2025/2026	In Progress	-
17	Vehicles WWTW and Distribution	Yes	Yes	R17 159	27.7%	R3 950	R3 578	91%	Loans, Own Funding	Sewer	2020/2021	2024/2025	In Progress	-
18	Generator Shelters and Security Booths at Pumpstations	Yes	Yes	R1 627	63.1%	R848	R838	99%	Own Funding	Sewer	2021/2022	2024/2025	In Progress	-
19	Upgrading Depot Facilities	Yes	Yes	R1 672	64.1%	R449	R447	100%	Own Funding	Sewer	2021/2022	2025/2026	In Progress	-
20	Thembalethu P/S 6	Yes	Yes	R22 159	16.5%	R3 604	R3 339	93%	Loans, RBIG, MIG	Sewer	2021/2022	2025/2026	In Progress	-
21	Tools & Equipment - Sewer Network	Yes	Yes	R723	12.7%	R80	R48	60%	Own Funding	Sewer	2021/2022	2025/2026	In Progress	-
22	Upgrading of Access Roads & Fencing (Pump Stations)	Yes	Yes	R3 853	34.4%	R697	R697	100%	Own Funding	Sewer	2021/2022	2025/2026	In Progress	-
23	Fence at Gwaing WWTW	Yes	Yes	R2 590	61.4%	R1 600	R1 590	99%	Loans	Sewer	2022/2023	2023/2024	In Progress	-
24	Paving Roads Gwaing WWTW	Yes	Yes	R3 048	40.9%	R500	R500	100%	Loans	Sewer	2021/2022	2023/2024	In Progress	-
25	Flood Damage Gwaing WWTW: Slip Failure Maturation	No	Yes	R1 337	100.0%	R663	R0	0%	Own Funding	Sewer	2021/2022	2022/2023	Completed	2022/2023
26	Flood Damage Gwaing WWTW: Donga	No	Yes	R2 047	60.9%	R806	R0	0%	Municipal Disaster Recovery Grant	Sewer	2021/2022	2024/2025	In Progress	-
27	Flood Damage Outeniqua WWTW: Donga	No	Yes	R8 242	21.1%	R6 284	R1 620	26%	Loans, Own Funding, MDRG	Sewer	2021/2022	2023/2024	In Progress	-
28	Fencing Kleinkrantz WWTW	Yes	Yes	R1 498	100.0%	R543	R542	100%	Own Funding	Sewer	2021/2022	2022/2023	Completed	2022/2023
29	Fencing Outeniqua WWTW	Yes	Yes	R2 930	59.0%	R1 730	R1 730	100%	Loans	Sewer	2022/2023	2023/2024	In Progress	-

Note: Total Project Cost: Actual expenditure from 2018/2019 to 2022/2023 plus approved budgets for period 2023/2024 to 2025/2026

Table B.3.2: Sewerage Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Project Progress (%)	Year 0 Performance - FY2022/23			Funding Source(s) for 2022/2023	Project Category / Type	Planned Period		Project Status	Actual Completion Year
		WSDP	IDP			FY Budget R'000	Expended R'000	%			From FY	To FY		
30	Property Development - Sweatpea Street Residential	Yes	Yes	R1 845	R0	R75	R0	0%	Own Funding	Sewer	2022/2023	2023/2024	Not implemented	-
31	Heralds Bay Pump Station	Yes	Yes	R19 995	4.1%	R1 000	R820	82%	Own Funding	Sewer	2022/2023	2025/2026	In Progress	-
32	Two-Way Radio Systems	Yes	Yes	R161	25.7%	R50	R41	83%	Own Funding	Sewer	2022/2023	2025/2026	In Progress	-
33	Security Fencing	Yes	Yes	R5 920	32.4%	R2 000	R1 920	96%	Own Funding	Sewer	2022/2023	2024/2025	In Progress	-
34	Connection of Houses to Main Sewer	Yes	Yes	R1 485	100.0%	R1 500	R1 485	99%	Own Funding	Sewer	2022/2023	2022/2023	Completed	2022/2023
35	Pacaltsdorp Pumpstation 3 Upgrade	Yes	Yes	R16 400	5.5%	R900	R900	100%	Own Funding	Sewer	2022/2023	2025/2026	In Progress	-
36	Upgrade Pacaltsdorp 3 Pumpstation (Mechanical)	Yes	Yes	R3 216	37.8%	R1 390	R1 216	88%	Loans	Sewer	2022/2023	2023/2024	In Progress	-
37	Flood Disaster Grant Items (MDRG)	No	Yes	R0	0.0%	R4 875	R0	0%	MDRG	Sewer	2022/2023	2022/2023	Not implemented	-
38	Welgelegen Pumpstation Upgrading (MDRG)	Yes	Yes	R0	0.0%	R2 031	R0	0%	MDRG	Sewer	2022/2023	2022/2023	Not implemented	-
39	Upgrade Laboratory - WWTW	Yes	Yes	R868	42.4%	R667	R368	55%	Loans, Own Funding	Sewer	2022/2023	2024/2025	In Progress	-
40	Fencing - Uniondale WWTW	Yes	Yes	R740	100.0%	R740	R740	100%	Own Funding	Sewer	2022/2023	2022/2023	Completed	2022/2023
41	UF Plant - Rehabilitation	No	Yes	R398	74.9%	R1 500	R298	20%	Own Funding	Sewer	2022/2023	2023/2024	In Progress	-
42	Generator - WWTW (Loadshedding)	Yes	Yes	R792	100.0%	R9 452	R792	8%	Emergengy Municipal Load-Shedding Relief Grant	Sewer	2022/2023	2022/2023	Completed	2022/2023
43	Telemetry - WWTW	Yes	Yes	R1 334	21.3%	R285	R284	100%	Own Funding	Sewer	2022/2023	2024/2025	In Progress	-
44	Upgrading of Eden Pumpstation (Mechanical) (RBIG)	Yes	Yes	R26 184	9.3%	R2 427	R2 427	100%	RBIG	Sewer	2022/2023	2024/2025	In Progress	-
45	Kleinkrantz WWTW (Sludge Dewatering Plant)	No	Yes	R20 827	5.2%	R1 100	R1 077	98%	Loans, Own Funding	Sewer	2022/2023	2025/2026	In Progress	-
46	Gwaing WWTW: Ph 2: Digestor & PST Sludge Pumpst, Inlet & Outlet	No	Yes	R31 502	1.6%	R550	R503	92%	Loans	Sewer	2022/2023	2025/2026	In Progress	-
47	Heroldsbay WWTW- Concrete Walls of Ponds	No	Yes	R13 222	2.9%	R400	R377	94%	Loans	Sewer	2022/2023	2024/2025	In Progress	-
Total Sewerage				**R710 035**		**R147 394**	**R109 449**	**74%**						
Total Water and Sewerage				**R1 710 176**		**R546 851**	**R366 912**	**67%**						

Note: Total Project Cost: Actual expenditure from 2018/2019 to 2022/2023 plus approved budgets for period 2023/2024 to 2025/2026

B.4. Past Financial Year Water Services Projects Impact Declaration

The impact of the water and sewerage capital projects, implemented by George Municipality during the previous financial year, were as follows.

Table B.4.1: Past Financial Year Project Impact Declaration for Water Projects

Nr	Project Title and Description	Project Category	Settlements which benefitted	Nr Beneficiaries		Impact Declaration
				Households	Population	
1	Dam Safety Construction	Other	-	-	-	Project was not implemented during the 2020/2021 financial year.
2	Uniondale Reservoir (500Kl)	Reservoir Storage	Uniondale	1467	5937	Ensure 24 hours AADD storage capacity.
3	Pacaltsdorp 14.5Ml Reservoir And 2.4Ml Water Tower	Reservoir Storage	Pacaltsdorp	2000	7000	Ensure 24 hours AADD storage capacity.
4	Filter Sand At Waterworks	WTW	-	-	-	Ensure SANS241:2015 water quality compliance.
5	Extension Of Waterworks 20Ml	WTW	George/Wilderness	62915	223254	Increase water treatment capacity and ensure SANS241:2015 water quality compliance.
6	Uniondale Waterworks Office Building (Process Controllers)	WTW	-	-	-	Provide office for Process Controllers. Improved working conditions.
7	Kaaimans Water Pump Station Rehabilitation	Pump Stations	George/Wilderness	62915	223254	Increase assurance of supply of raw water for George / Wilderness (Source Augmentation).
8	Fence at Old Waterworks	Security	-	-	-	Project was not implemented during the 2022/2023 financial year.
9	Haarlem Waterworks Office Building	WTW	-	-	-	Provide office for Process Controllers. Improved working conditions.
10	Telemetry - Water Purification	WTW	George/Wilderness	-	-	Upgrade telemetry system in order to ensure ensure adequate operation and monitoring of the WTWs.
11	Extractor Fans - Chlorine Rooms	WTW	-	-	-	Improved safety at chlorine installations at the WTWs.
12	Network Rehabilitation - Water	Reticulation	Management Area	576	2017	Replace old sections of water network with regular pipe bursts. Reduce NRW and Water Losses.
13	Upgrading Of Asbestos Pipes - Greater George	Reticulation	George	81	282	Replace old sections of water network with regular pipe bursts. Reduce NRW and Water Losses.
14	Airport Mainline Upgrade	Bulk Water Pipelines	George	Unknown	Unknown	Increase bulk water pipeline capacity in order to ensure adequate supply.
15	N2 Thembalethu Crossing Upgrade	Bulk Water Pipelines	Thembalethu	11310	52478	Increase bulk water pipeline capacity in order to ensure adequate supply.
16	Upgrading Depot Facilities	Other	Management Area	-	-	Efficient operation of water distribution system.
17	Industrial Water Pipeline Re-Alignment	Reticulation	George	18	62	Ensure adequate water reticulation capacity.
18	Installation Of New Meters - Water Distribution	WC/WDM	Management Area	-	-	Ensure all water usage is metered. Reduce NRW and Water Losses.
19	Telemetry And Loggers - Water Distribution	WC/WDM	Management Area	-	-	Efficient operation of water distribution system. Monitoring of water usage and water losses.
20	Tools And Equipment - Water Distribution	Other	Management Area	-	-	Ensure adequate operation of water reticulation networks.
21	Bakkies: Water Distribution	Other	Management Area	-	-	Ensure adequate operation of water reticulation networks.
22	Water Trucks	Other	Management Area	-	-	Ensure adequate water supply with trucks.
23	Installation of Bulk Meters	WC/WDM	Management Area	-	-	Ensure all bulk water is metered. Reduce NRW and Water Losses.
24	Tools and Equipment - Water Purification	Other	Management Area	-	-	Ensure adequate operation of water purification.
25	Pipework Rehabilitation: Garden Route Dam	Bulk Water Pipelines	George/Wilderness	62915	223254	Ensure adequate bulk water supply from Garden Route Dam.
26	Thembalethu (East) Reservoir, Tower and Pump Station	Pump Stations and Reservoirs	Thembalethu	11310	52478	Ensure 24 hours AADD storage capacity and adequate supply to Thembalethu.
27	Pacaltsdorp (East) Reservoir, Tower and Pump Station	Pump Stations and Reservoirs	Pacaltsdorp	4000	14000	Ensure 24 hours AADD storage capacity and adequate supply to Pacaltsdorp.
28	Balancing Dam	Raw Water Storage	George/Wilderness	62915	223254	Ensure adequate raw water storage capacity for supply to WTWs.
29	Thembalethu Pumpstation and 6Ml Reservoir	Pump Stations and Reservoirs	Thembalethu	11310	52478	Ensure 24 hours AADD storage capacity and adequate supply to Thembalethu.
30	Rehabilitation of Old WTW (6Ml Module)	WTW	George/Wilderness	62915	223254	Increase water treatment capacity and ensure SANS241:2015 water quality compliance.
31	Generator - Garden Route Dam Pumpstation	Pump Stations	George/Wilderness	62915	223254	Ensure adequate bulk water supply from source during Eskom load shedding periods.
32	Furniture and Office Equipment - Water Purification	Other	Management Area	-	-	Provide sufficient furniture and equipment to PCs at the plants.
33	Fence at WTW	WTW	Management Area	-	-	Improve security at WTWs in order to prevent possible theft and vandalism.

Table B.4.1: Past Financial Year Project Impact Declaration for Water Projects

Nr	Project Title and Description	Project Category	Settlements which benefitted	Nr Beneficiaries		Impact Declaration
				Households	Population	
34	Property Development - Sweatpea Street Residential	Reticulation	-	-	-	Project was not implemented during the 2022/2023 financial year.
35	Two-Way Radio Systems	Other	-	-	-	Ensure adequate operation of water reticulation networks and treatment plants.
36	Provision of Water Tanks	Other	Management Area	25	100	Provide basic communal water services.
37	Trailers for Tools and Equipment	Other	-	-	-	Ensure adequate operation of water reticulation networks.
38	Pressure Reducing Valves	WC/WDM	George	Unknown	Unknown	Implementation of pressure reduction to reduce water losses.
39	Swart River Dam Safety Construction (MDGR)	Other	George/Wilderness	-	-	Project was not implemented during the 2022/2023 financial year.
40	Swart River Dam Access Phase 2 (MDRG)	Other	-	-	-	Project was not implemented during the 2022/2023 financial year.
41	Water Treatment Works-Flooding (MDRG)	Other	-	-	-	Project was not implemented during the 2022/2023 financial year.
42	Uniondale Water Network Rehabilitation	Reticulation	Uniondale	52	207	Replace old sections of water network with regular pipe bursts. Reduce NRW and Water Losses.
43	Installation of Smart Meters	WC/WDM	George	4611	16139	Ensure all water usage is accurately metered. Implementation of water meter replacement programme.
44	Installation of New Water Connections	Reticulation	Management Area	171	600	Provide higher level of water services to all formal erven. Water connection inside the erf.
45	Installation of Burst Control Valves	WC/WDM	George	-	-	Reduce water losses during pipe bursts on bulk water distribution pipelines. Increase assurance of supply.
46	Upgrading of Security at Facilities	Security	-	-	-	Project was not implemented during the 2022/2023 financial year.
47	Leak Detector - Water	WC/WDM	Management Area	-	-	Implementation of WC/WDM measures to reduce water losses.
48	Clamp on Flow Meters for Leak Detectors	WC/WDM	Management Area	-	-	Implementation of WC/WDM measures to reduce water losses.
49	Inspection Camera	WC/WDM	Management Area	-	-	Implementation of WC/WDM measures to reduce water losses.
50	CCTV Cameras - Water Facilities (EFF)	Security	Management Area	-	-	Improved security measures at the WTWs, in order to prevent theft, vandalism and illegal access.
51	Upgrading of Conville Water: Phase 1 & 2 (MIG)	Reticulation	George	163	571	Provide higher level of water services to all formal erven.
52	Malgas Water Pump Station Rehabilitation	Pump Stations	George/Wilderness	62915	223254	Ensure adequate bulk raw water supply from Malgas. Increase assurance of supply.
53	Generators - Water Purification	WTW	Management Area	-	-	Provide back-up power during load shedding periods at the WTWs in order to ensure adequate potable water supply.
54	Fencing at Reservoirs	Security	-	-	-	Improved security measures at the reservoir sites, in order to prevent theft, vandalism and illegal access to reservoirs
55	Fencing at Uniondale and Haarlem WTW	Security	-	-	-	Improved security measures at the WTWs, in order to prevent theft, vandalism and illegal access.
56	George New WTW - Handrails	Safety	-	-	-	Project was not implemented during the 2022/2023 financial year.
57	All Water Pump Stations (Spectrum) Pepperspray	Security	-	-	-	Improved security measures at the pump stations, in order to prevent theft, vandalism and illegal access.
58	Wilderness Waterworks	WTW	Wilderness	-	-	Ensure SANS 241:2015 water quality compliance.
59	Borehole Safety Enclosures	Security	-	-	-	Improved security measures at the boreholes, in order to prevent theft, vandalism and illegal access.
	TOTAL			**487496**	**1767129**	

Table B.4.2: Past Financial Year Project Impact Declaration for Sewerage Projects

Nr	Project Title and Description	Project Category	Settlements which benefitted	Nr Beneficiaries		Impact Declaration
				Households	Population	
1	Wilderness Kleinkrantz Main Sewer Line Upgrade	Bulk Sewer Pipeline	Wilderness/Kleinkrantz	933	2377	Ensure adequate bulk sewer pipeline capacity
2	Telemetry And Service Network System	Other	Management Area	-	-	Efficient operation of sewer drainage network
3	Upgrade Electrical Switch Gear At Sewer Pump Stations	Pump Stations	Management Area	-	-	Ensure adequate pump capacity
4	Upgrade Pumpstations - Sewer	Pump Stations	Management Area	-	-	Ensure adequate pump capacity
5	Sewerage Network Rehabilitation	Drainage Network	Management Area	301	1054	Replace old sections of sewer drainage networks and areas with inadequate drainage capacity
6	Upgrading Of Meul Street Pumpstation	Pump Stations	George	9437	33488	Ensure adequate pump capacity
7	Schaapkop Pumpstation (Install Inlet Screens)	Pump Stations	George	15729	55814	Ensure adequate pump capacity
8	Honey Suckers Trucks For Pumpstations	Other	-	-	-	Prevent spillages at sewer pump stations during load shedding periods. Ensure sufficient trucks for the emptying of tanks
9	Thembalethu UISP Bulk	Bulk Sewer Pipeline	Thembalethu	11310	52478	Ensure adequate bulk sewer pipeline capacity
10	Outeniqua 10Ml Addition - WWTW	WWTW	George	18267	64820	Ensure compliance with General Limits for quality of effluent discharged from the WWTW and adequate treatment capacity to meet the future requirements.
11	Gwaing Sewer Treatment - Reinstate 3.5Ml	WWTW	George	17307	60573	Ensure compliance with General Limits for quality of effluent discharged from the WWTW and adequate treatment capacity to meet the future requirements.
12	Furniture And Fittings - Laboratory	Other	George	-	-	Ensure adequate office equipment for Laboratory personnel at WWTW
13	Furniture And Fittings - Water Contamination Control	Other	Management Area	-	-	Ensure adequate office equipment for Process Controllers at WWTW
14	Refurbishment Of Belt Presses At Gwaiing WWTW	WWTW	George	-	-	Ensure compliance with the sludge handling requirements at the Gwaing WWTW
15	Laboratory Instruments - WWTW	Other	Management Area	-	-	Ensure adequate wastewater sampling and monitoring instruments
16	Tools And Equipment - WWTW	Other	Management Area	-	-	Ensure adequate tools and equipment for Process Controllers at WWTWs
17	Vehicles WWTW	Other	Management Area	-	-	Ensure adequate vehicles for WWTW personnel
18	Generator Shelters and Security Booths at Pumpstations	Pump Stations	Management Area	-	-	Ensure adequate pump capacity during Eskom load shedding periods
19	Upgrading Depot Facilities	Other	Management Area	-	-	Ensure adequate facilities
20	Thembalethu P/S 6	Pump Station	Thembalethu	-	-	Ensure adequate pump capacity
21	Tools & Equipment - Sewer Network	Other	Management Area	-	-	Ensure adequate operation of sewerage infrastructure
22	Upgrading of Access Roads & Fencing (Pump Stations)	Pump Stations	Management Area	-	-	Improve access roads and security at sewer pump stations. Prevent possible vandalism and theft.
23	Fence at Gwaing WWTW	WWTW	George	-	-	Improve security and safety at Gwaing WWTW
24	Paving Roads Gwaing WWTW	WWTW	George	-	-	Improve access at Gwaing WWTW
25	Flood Damage Gwaing WWTW: Slip Failure Maturation	WWTW	George	-	-	Repair flood damage at plant
26	Flood Damage Gwaing WWTW: Donga	WWTW	George	-	-	Repair flood damage at plant
27	Flood Damage Outeniqua WWTW: Donga	WWTW	George	-	-	Repair flood damage at plant
28	Fencing Kleinkrantz WWTW	WWTW	Wilderness	-	-	Improve security and safety at Kleinkrantz WWTW
29	Fencing Outeniqua WWTW	WWTW	George	-	-	Improve security and safety at Outeniqua WWTW

Table B.4.2: Past Financial Year Project Impact Declaration for Sewerage Projects						
Nr	Project Title and Description	Project Category	Settlements which benefitted	Nr Beneficiaries		Impact Declaration
				Households	Population	
30	Property Development - Sweatpea Street Residential	Drainage Network	George	-	-	Project was not implemented during the 2022/2023 financial year.
31	Herolds Bay Pump Station	Pump Stations	Herolds Bay	520	1200	Ensure adequate pump capacity
32	Two-Way Radio Systems	Other	Management Area	-	-	Ensure adequate operation of sewer drainage networks and treatment plants.
33	Security Fencing	Security	Management Area	-	-	Improved security measures at sewerage infrastructure, in order to prevent theft, vandalism and illegal access.
34	Connection of Houses to Main Sewer	Drainage Network	Management Area	59	208	Provide highler level of sewer services to all formal erven. Sewer connection inside the erf.
35	Pacaltsdorp Pumpstation 3 Upgrade	Pump Stations	Pacaltzdorp	-	-	Ensure adequate pump capacity
36	Upgrade Pacaltsdorp 3 Pumpstation (Mechanical)	Pump Stations	Pacaltzdorp	-	-	Ensure adequate pump capacity
37	Flood Disaster Grant Items (MDRG)	Other	-	-	-	Project was not implemented during the 2022/2023 financial year.
38	Welgelegen Pumpstation Upgrading (MDRG)	Pump Stations	-	-	-	Project was not implemented during the 2022/2023 financial year.
39	Upgrade Laboratory - WWTW	WWTW	Management Area	-	-	Ensure adequate sampling facilities and equipment for the laboratory, in order to implement sampling programmes.
40	Fencing - Uniondale WWTW	Security	-	-	-	Improved security measures at the WWTW, in order to prevent theft, vandalism and illegal access.
41	UF Plant - Rehabilitation	WWTW	George/Wilderness	62915	223254	Increase assurance of raw water supply (Source Augmentation)
42	Generator - WWTW (Loadshedding)	WWTW	Management Area	-	-	Provide back-up power during load shedding periods at the WWTWs, in order to ensure adequate sewage treatment.
43	Telemetry - WWTW	WWTW	Management Area	-	-	Efficient operation of WWTWs and pump stations.
44	Upgrading of Eden Pumpstation (Mechanical) (RBIG)	Pump Stations	George	-	-	Ensure adequate pump capacity
45	Kleinkrantz WWTW (Sludge Dewatering Plant)	WWTW	-	-	-	Ensure compliance with the sludge handling requirements at the Kleinkrantz WWTW
46	Gwaing WWTW: Ph 2: Digestor & PST Sludge Pumpst, Inlet &	WWTW	-	-	-	Ensure compliance with final effluent quality (General Limits)
47	Heroldsbay WWTW- Concrete Walls of Ponds	WWTW	-	-	-	Implementation of refurbishment work at the ponds, in order to prevent leakage from the ponds.
	TOTAL			**136778**	**495266**	

C. WATER SERVICES AUDIT REPORT

C.1. Quantity of Water Services Provided (Water Balance)

Detail IWA Water Balances are available for each of the water distribution systems in George Municipality's Management Area. The graph below gives an overview of the total annual raw water supplied for all the systems.

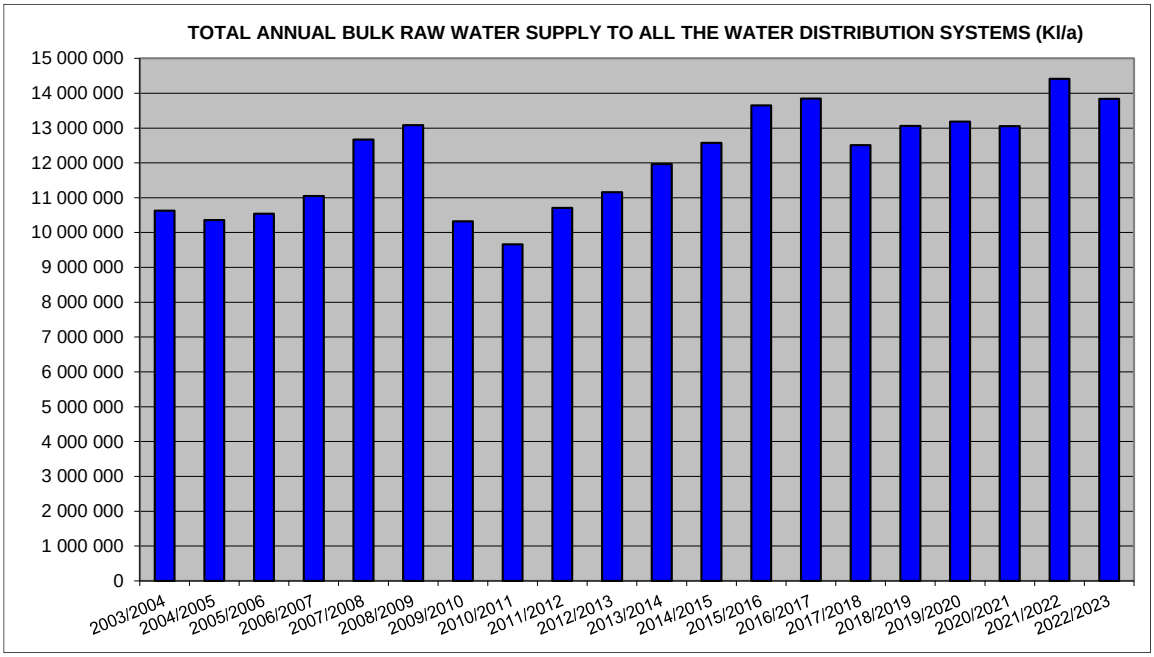


Figure C.1.1: Total annual bulk raw water supply to all the towns in George Municipality

The graph below gives an overview of the total annual bulk raw water supplied to the various distribution systems within George Municipality's Management Area.

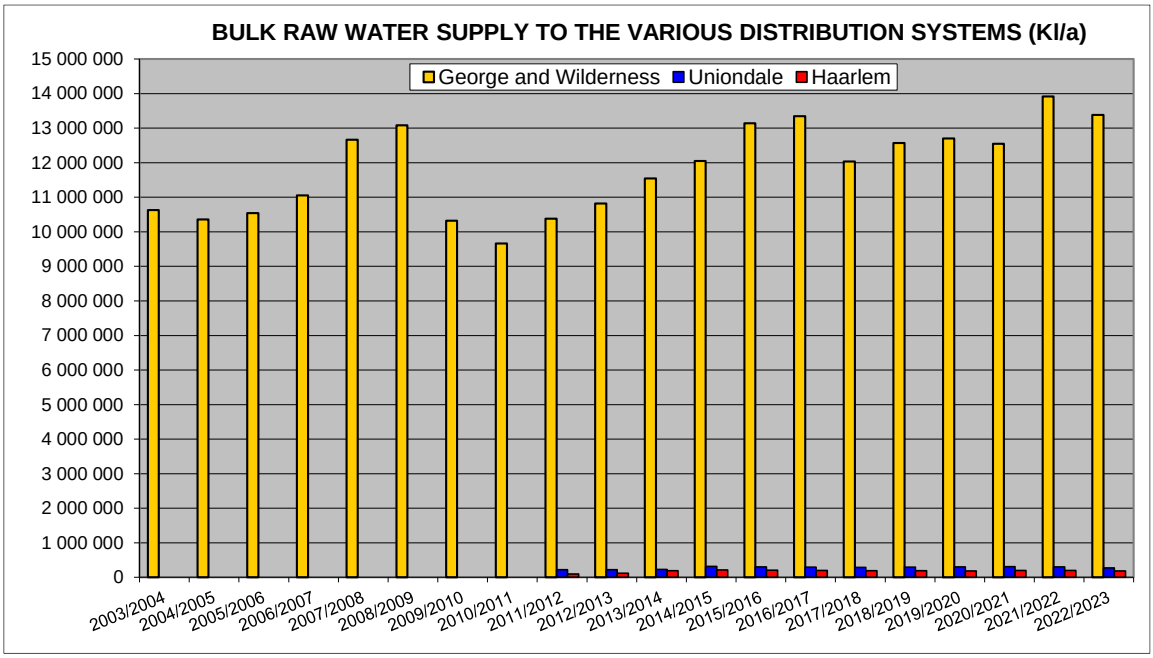


Figure C.1.2: Bulk raw water supplied to the George/Wilderness, Uniondale and Haarlem systems

The reduction in the total raw water requirements for the period 2009 to 2011 and again for the period 2015 to 2017 can be noted on the above two graphs due to the severe droughts over these periods.

All water sources are supplied with bulk water meters and accurate records are kept of all bulk water meter readings. The table below gives a summary of the total bulk raw water supplied to the various towns within George Municipality's Management Area.

Table C.1.1: Bulk raw water supplied to the various distribution systems							
Distribution System	**Source**	**22/23**	**Record : Prior (Ml/a)**				
			21/22	**20/21**	**19/20**	**18/19**	**17/18**
George / Wilderness	Swart and Kaaimans Rivers (GRD)	13 091.120	13 571.178	12 204.035	12 360.581	12 198.833	11 472.853
	Touw River	289.643	347.316	342.078	338.754	373.408	327.185
	Groundwater	0.000	0.000	0.000	0.000	0.000	232.461
Sub Total		13 380.763	13 918.494	12 546.113	12 699.335	12 572.241	12 032.499
Uniondale	Haarlem Dam and Kammanassie River	274.845	398.918	308.454	303.247	292.995	286.582
Haarlem	Haarlem Dam	183.480	197.550	197.042	181.530	194.853	194.084
Total		**13 839.088**	**14 414.962**	**13 051.609**	**13 184.112**	**13 060.089**	**12 513.165**

Le Grand Safmag flow meter

Ebb and Flow WTW: Touwsranten PS flow meter

Volume of water used by each user sector:

The figure below gives an overview of George Municipality's overall water usage per Sector for the various financial years.

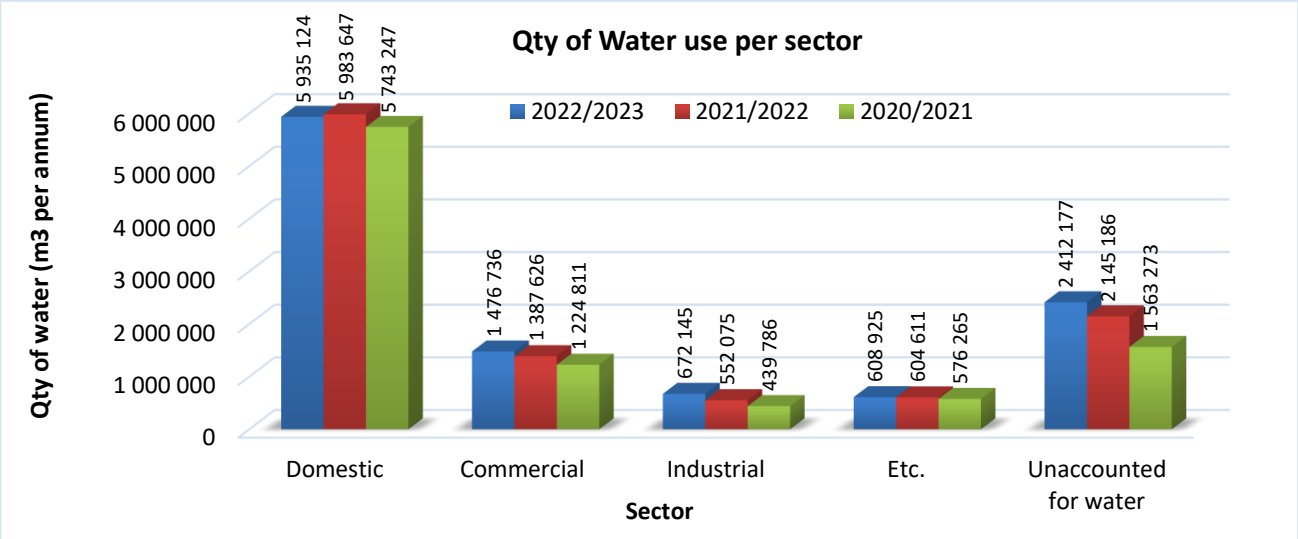


Figure C.1.3: Quantity of water services provided / water balance

The table below gives an overview of the volume of water services provided / water balance for all the distribution systems in George Municipality's Management Area.

Table C.1.2: Quantity of Water Services Provided / Water Balance

WSDP Ref. #	Regulations Ref. #	Description	m^3 per annum			Ml/d		
			Year 0	Year - 1	Year - 2	Year 0	Year - 1	Year - 2
			FY2022/23	FY2021/22	FY2020/21	FY2022/23	FY2021/22	FY2020/21
		RAW WATER						
7.2.1		Surface water purchased	183 480	197 550	197 042	0.50	0.54	0.54
7.1 / 7.2.2		Surface water abstracted	13 655 608	14 217 412	12 854 567	37.41	38.95	35.22
7.1 / 7.2.3		Ground water abstracted	0	0	0	0.00	0.00	0.00
7.2.14		Effluent recycled	0	0	0	0.00	0.00	0.00
7.2.4		*less* Raw water supplied to others	0	0	0	0.00	0.00	0.00
7.2.5		**Sub-Total: Raw Water supplied**	**13 839 088**	**14 414 962**	**13 051 609**	**37.92**	**39.49**	**35.76**
	10.2 (g) (i)	**BULK WATER SUPPLY**						
7.2.6		Volume of water treated	12 995 177	12 668 582	11 402 479	35.60	34.71	31.24
7.2.7	10.2 (a) (ii)	Purchased treated water	0	0	0	0.00	0.00	0.00
7.2.7A		Ground water not treated	0	0	0	0.00	0.00	0.00
7.2.6A		*less* Treated water supplied to others	0	0	0	0.00	0.00	0.00
		Sub-Total: System Input Volume	**12 995 177**	**12 668 582**	**11 402 479**	**35.60**	**34.71**	**31.24**
		WATER CONSUMPTION						
7.2.8.1		Billed Metered:	8 692 930	8 527 959	7 984 109	23.82	23.36	21.87
	10.2 (a) (i)	Domestic	5 935 124	5 983 647	5 743 247	16.26	16.39	15.73
	10.2 (a) (i)	Commercial	1 476 736	1 387 626	1 224 811	4.05	3.80	3.36
	10.2 (a) (i)	Industrial	672 145	552 075	439 786	1.84	1.51	1.20
	10.2 (a) (i)	etc.	608 925	604 611	576 265	1.67	1.66	1.58
7.2.8.2		Billed Unmetered	384 480	368 640	374 580	1.05	1.01	1.03
	10.2 (a) (i)	Domestic	384 480	368 640	374 580	1.05	1.01	1.03
	10.2 (a) (i)	Commercial	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	Industrial	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	etc.	0	0	0	0.00	0.00	0.00
7.2.8.3		Unbilled Metered	0	0	0	0.00	0.00	0.00
7.2.8.4		Unbilled Unmetered	1 505 590	1 626 797	1 480 517	4.12	4.46	4.06
	10.2 (g) (i)	**Sub-Total: Authorized consumption**	**10 583 000**	**10 523 396**	**9 839 206**	**28.99**	**28.83**	**26.96**
		UNACCOUNTED FOR WATER						
7.3.1		Raw water bulk loss	843 911	1 746 380	1 649 130	2.31	4.78	4.52
7.2.3/7.2.4		Billing losses	1 505 590	1 626 797	1 480 517	4.12	4.46	4.06
7.2.5		Apparent losses	361 827	321 778	234 491	0.99	0.88	0.64
7.2.5.1		Illegal connections	72 365	64 356	46 898	0.20	0.18	0.13
7.2.5.2		Inaccurate meters	168 852	150 163	109 429	0.46	0.41	0.30
7.2.5.3		Data errors	120 609	107 259	78 164	0.33	0.29	0.21
7.2.6		Real losses	2 050 350	1 823 408	1 328 782	5.62	5.00	3.64
	10.2 (g) (ii)	**Sub-Total: Unaccounted for water**	**2 412 177**	**2 145 186**	**1 563 273**	**6.61**	**5.88**	**4.28**
		WASTEWATER TREATMENT						
7.2.9	10.2 (a) (iii)	Total received at WWTW	7 944 499	7 127 574	6 177 215	21.77	19.53	16.92
7.2.11		Total discharged	6 355 599	5 702 059	4 941 772	17.41	15.62	13.54
7.2.13		Returned to environment	6 196 709	5 559 508	4 818 228	16.98	15.23	13.20
7.2.14		Recycled	158 890	142 551	123 544	0.44	0.39	0.34
	10.2 (a) (iv)	**Quantity of water supplied not discharged to WWTWs**	**2 638 501**	**3 395 822**	**3 661 991**	**7.23**	**9.30**	**10.03**

Graphs of the water usage per sector (Billed Metered Consumption) for the various distribution systems within George Municipality's Management Area are included as part of the IWA water balance models in Annexure A.

The table below gives a summary of the information.

Table C.1.3: Annual volume billed metered consumption for each user sector (Ml)						
Town	**Year**	**Residential**	**Business**	**Industrial**	**Other**	**Total**
George	07/08	5 214.885	1 520.370	451.330	802.639	**7 989.224**
	08/09	5 594.955	1 437.222	580.587	708.161	**8 320.925**
	09/10	4 364.763	1 104.860	605.533	503.636	**6 578.792**
	10/11	4 200.445	1 013.916	517.767	460.014	**6 192.142**
	11/12	4 761.894	1 711.667		575.256	**7 048.817**
	12/13	4 960.788	1 785.858		642.519	**7 389.165**
	13/14	5 126.164	1 431.157	339.736	625.485	**7 522.542**
	14/15	5 248.740	1 422.900	415.349	623.971	**7 710.960**
	15/16	5 486.784	1 577.371	446.629	631.930	**8 142.714**
	16/17	5 604.286	1 409.967	462.891	613.227	**8 090.371**
	17/18	4 818.074	1 275.742	419.146	529.622	**7 042.584**
	18/19	5 062.589	1 368.286	476.833	612.537	**7 520.245**
	19/20	5 353.922	1 291.388	481.605	531.160	**7 658.075**
	20/21	5 525.324	1 188.660	439.786	566.270	**7 720.040**
	21/22	5 777.219	1 364.191	552.075	593.097	**8 286.582**
	22/23	5 711.461	1 447.590	672.145	600.125	**8 431.321**
Uniondale	11/12	149.867	40.213	0	14.516	**204.596**
	12/13	133.101	27.212	0	7.494	**167.807**
	13/14	128.250	25.685	0	6.272	**160.207**
	14/15	144.709	25.987	0	13.192	**183.888**
	15/16	128.723	24.039	0	16.838	**169.600**
	16/17	130.234	28.824	0	14.092	**173.150**
	17/18	123.958	28.415	0	19.635	**172.008**
	18/19	127.363	34.867	0	8.266	**170.496**
	19/20	143.851	36.572	0	11.137	**191.560**
	20/21	143.096	36.060	0	9.078	**188.234**
	21/22	132.921	23.329	0	8.171	**164.421**
	22/23	136.812	28.946	0	6.904	**172.662**
Haarlem	11/12	77.602	0.006	0	1.175	**78.783**
	12/13	85.802	5.684	0	4.540	**96.026**
	13/14	78.132	0.424	0	8.104	**86.660**
	14/15	74.403	1.080	0	7.421	**82.904**
	15/16	85.107	0.101	0	6.983	**92.191**
	16/17	85.438	0.051	0	8.291	**93.780**
	17/18	73.263	0.109	0	8.005	**81.377**
	18/19	71.338	0.203	0	5.423	**76.964**
	19/20	77.028	0.061	0	5.379	**82.468**
	20/21	74.827	0.091	0	0.917	**75.835**
	21/22	73.507	0.106	0	3.343	**76.956**
	22/23	86.851	0.200	0	1.896	**88.947**
TOTAL	**07/08**	**5 214.885**	**1 520.370**	**451.330**	**802.639**	7 989.224
	08/09	**5 594.955**	**1 437.222**	**580.587**	**708.161**	8 320.925
	09/10	**4 364.763**	**1 104.860**	**605.533**	**503.636**	6 578.792
	10/11	**4 200.445**	**1 013.916**	**517.767**	**460.014**	6 192.142
	11/12	**4 989.363**	**1 751.886**		**590.947**	7 332.196
	12/13	**5 179.691**	**1 818.754**		**654.553**	7 652.998
	13/14	**5 332.546**	**1 457.266**	**339.736**	**639.861**	7 769.409
	14/15	**5 467.852**	**1 449.967**	**415.349**	**644.584**	7 977.752
	15/16	**5 700.614**	**1 601.511**	**446.629**	**655.751**	8 404.505
	16/17	**5 819.958**	**1 438.842**	**462.891**	**635.610**	8 357.301
	17/18	**5 015.295**	**1 304.266**	**419.146**	**557.262**	7 295.969
	18/19	**5 261.290**	**1 403.356**	**476.833**	**626.226**	7 767.705
	19/20	**5 574.801**	**1 328.021**	**481.605**	**547.676**	7 932.103
	20/21	**5 743.247**	**1 224.811**	**439.786**	**576.265**	7 984.109
	21/22	**5 983.647**	**1 387.626**	**552.075**	**604.611**	8 527.959
	22/23	**5 935.124**	**1 476.736**	**672.145**	**608.925**	8 692.930

The graph below gives an overview of the annual water usage per sector for the various financial years for the George/Wilderness water distribution system.

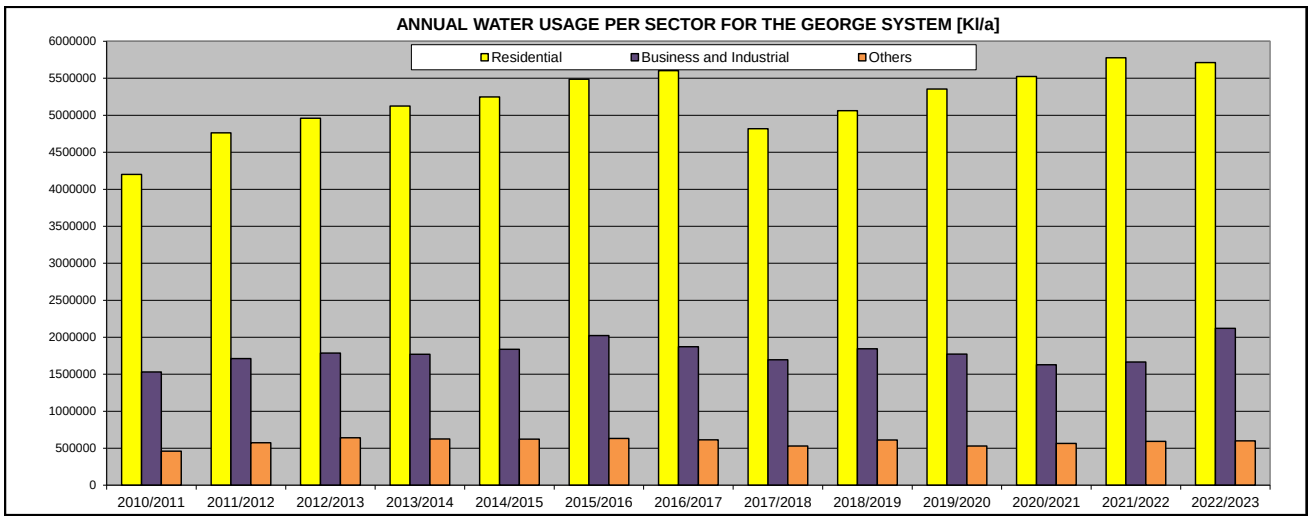


Figure C.1.4: Annual water usage per sector for the George/Wilderness system

Quantity of effluent received at the WWTWs (Ml/a):

All the WWTWs in George Municipality's Management Area are supplied with bulk flow meters, except the Haarlem WWTW. The table below gives an overview of the annual volume of effluent received at the various WWTWs. The monthly hydraulic flows, organic loads and rainfall measured at the various WWTWs are included in Annexure A.

Table C.1.4: Volume of effluent received at the various WWTWs

WWTW	22/23	Record : Prior (Ml/a)				
		21/22	20/21	19/20	18/19	17/18
Outeniqua	2 912	2 969	2 815	2 959	3 480	3 377
Gwaing	4 468	3 600	2 815	2 565	2 655	2 899
Herolds Bay	60	59	56	54	59	49
Kleinkrantz	278	273	246	236	216	233
Uniondale	195	200	219	192	255	221
Haarlem*	31	27	27	29	27	28
Total	**7 944**	**7 128**	**6 178**	**6 035**	**6 692**	**6 807**

Note: * Effluent received at the Haarlem WWTW was estimated from the Billed Metered Consumption data

Quantity of treated effluent returned to the water resource system:

All effluent discharged into the Municipal sewer system is treated at the existing WWTWs and the current effluent re-use practices are as follows:

Table C.1.5: Current effluent re-used practices at the various WWTWs

WWTW	Current effluent re-used practices
Outeniqua	Small volume of treated effluent is re-use on-site at the plant. Treated effluent is returned to the Garden Route dam through the Reclamation Plant (Currently not in use).
Gwaing	Small volume of treated effluent is re-use on-site at the plant.
Herolds Bay	No re-use, all treated effluent evaporates and no returns are made to any Water Resource System.
Kleinkrantz	Small volume of treated effluent is re-use on-site at the plant. Final effluent is discharged onto the sand dunes adjacent to the WWTW.
Uniondale	Irrigation of lucerne fields by farmers.
Haarlem	Irrigation by farmer.

C.2. Water Services Delivery Profile

The National Norms and Standards for Domestic Water and Sanitation Services, as published in the Government Gazette No.41100 of 8 September 2017, make provision for the following norms and standards for levels of water supply and sanitation services:

Table C.2.1: Norms and standards for levels of water supply services

Full level of service: People access and pay for more than 90 l/c/d at high pressure.	Interim **Full**	**Full provision**: People access a minimum of 50 l/c/d of SANS241 quality water on demand at the boundary of the yard, metered and tariffed.
Middle level of service: People access and pay for 51-90 l/c/d at medium pressure.	Interim **Upper**	**Upper provision**: People access a maximum of 90 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Intermediate**	Intermediate provision: People access more than 50 l/c/d but less than 90 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
Minimum level of service: People access 25-50 l/c/d at low to medium pressure, use of more than 25 l/c/d is paid for.	Interim **Basic Plus**	**Basic Plus provision**: People access more than 25 l/c/d but less than 50 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Basic**	**Basic provision**: People access a minimum of 25 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Free Basic**	**Free basic provision**: People access a minimum of 25 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered.
	Intermittent	**Intermittent provision**: People access a minimum of 1500 l/household/week of acceptable quality water on a weekly basis within 100m, which is metered.
Bulk service: Source of potable water to be provided to people, which is metered in all circumstances.		
No service / provision = backlog: People access water from insecure or unimproved sources, or sources that are too distant, too time consuming or are of poor quality.		

Interim provision: People access a minimum of 25 l/c/d of acceptable quality water within 24 hours of disruption, normal service to be restored within 7 days.

Table C.2.2: Norms and standards for levels of sanitation services

Hygiene promotion; Prevention of pollution; Re-use / recycle; Operation and Maintenance; Metering and tariffing; Solid Waste Management; Asset Management		
Full level: Full concern for human health, environment and sustainability of interconnected systems.	**Full services**	**In-house facility**: Storm water, wastewater/excreta, greywater, solid waste are collected and managed to achieve maximum benefits from treatment and re-use of water and nutrients.
		In-house facility: Access to a pleasant, safe, reliable and properly maintained facility for 24 hours a day, with control of nutrients in human excreta, wastewater and greywater.
Basic level: Remove excreta from the environment through treatment, pathogen reduction, resource recovery and nutrient reuse.	**Free basic services**	**Toilet with functional hand washing facility in the yard**: Access to a pleasant, safe and reliable facility for 24 hours a day, including privacy, personal safety and shelter through a subsidy for free. Maintenance of the facility is for free and is the responsibility of services provider.
	Basic services	**Toilet with functional hand washing facility in the yard**. Access to a pleasant, safe and reliable facility for 24 hours a day, including privacy, personal safety and shelter through a capital subsidy. Maintenance of the facilities is not for free and is the responsibility of the household / owner.
Interim level: Blocking the spread of faecal-oral diseases through proper excreta containment at a fixed point.	**Excreta containment**	**Household, shared or communal toilets with functional hand washing facilities**: Access to safe, reliable and properly maintained toilet and hand washing facility, free of charge, within 200m of the dwelling, which at a minimum safely contains human excreta. Maintenance is the responsibility of the services provider. To be phased out by 2030.
No service / provision = backlog: People practice open defecation or access an unimproved sanitation facility, such as pit toilets and bucket toilets. To be completely eliminated by 2030.		

Proper disposal, clean platform, vector and rodent control, resource use and health protection.

Emergency level: People access pleasant, safe, reliable and properly maintained improved toilets and hand washing facility on the premises in close proximity to the temporary dwelling within 24 hours and for duration of event.

C.2.1. User Connection Profile

The total number of user connections in each user sector, for the consumers provided with water services by George Municipality, is as follows (June 2023):

Table C.2.1.1: User Connection Profile (Water Services)

WSDP Ref. #	Category of users	Water Services						
		Year 0 FY2022/23		Year - 1 FY2021/22		Year - 2 FY2020/21		New Connections Year 0 FY2022/23
		Nr	%	Nr	%	Nr	%	Nr
	RESIDENTIAL (DOMESTIC)							
3.3	Metered: Uncontrolled	37 291	77%	36 408	80%	35 822	80%	883
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0
	Unmetered (flat rate)	0	0%	0	0%	0	0%	0
	Communal water supply	8 355	17%	6 790	15%	6 600	15%	1 565
	Sub-Total: Residential	**45 646**	**95%**	**43 198**	**95%**	**42 422**	**95%**	**2 448**
	EDUCATION							
3.3	Schools	50	0%	50	0%	48	0%	0
	Tertiary educaton facilities	1	0%	1	0%	1	0%	0
	Sub-Total: Education	**51**	**0%**	**51**	**0%**	**49**	**0%**	**0**
	HEALTH							
3.3	Clinics	10	0%	10	0%	10	0%	0
3.3	Hospitals	3	0%	3	0%	3	0%	0
3.3	Health Centres	2	0%	2	0%	2	0%	0
	Sub-Total: Health	**15**	**0%**	**15**	**0%**	**15**	**0%**	**0**
	INSTITUTIONAL							
	Public Institutions (Governm./Sc)	77	0%	77	0%	79	0%	0
3.3	Magistrate Offices	1	0%	1	0%	1	0%	0
3.3	Police Stations	7	0%	7	0%	7	0%	0
3.3	Prisons	1	0%	1	0%	1	0%	0
	etc	0	0%	0	0%	0	0%	0
	Sub-Total: Institutional	**86**	**0%**	**86**	**0%**	**88**	**0%**	**0**
	INDUSTRIAL							
3.3	Dry industries (Incl. with Commercial)	0	0%	0	0%	0	0%	0
3.3	Wet industries	13	0%	13	0%	13	0%	0
	Sub-Total: Commercial	**13**	**0%**	**13**	**0%**	**13**	**0%**	**0**
	COMMERCIAL							
3.3	Businesses	2 087	4%	1 934	4%	1 812	4%	153
3.3	Office Buildings (Municipal Dep.)	209	0%	236	1%	249	1%	-27
	Sub-Total: Commercial	**2 296**	**5%**	**2 170**	**5%**	**2 061**	**5%**	**126**
	MINING							
		0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**
	OTHER							
	Agriculture: raw water	0	0%	0	0%	0	0%	0
	etc	158	0%	152	0%	149	0%	6
	Sub-Total: Other	**158**	**0%**	**152**	**0%**	**149**	**0%**	**6**
	TOTAL	**48 265**	**100%**	**45 685**	**100%**	**44 797**	**100%**	**2 580**

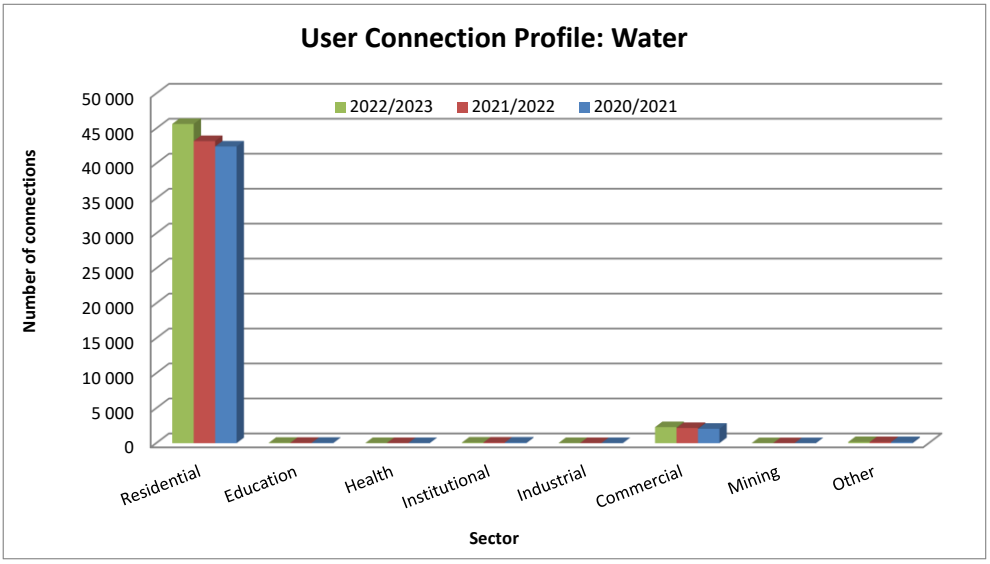


Figure C.2.1.1: User connection profile for water

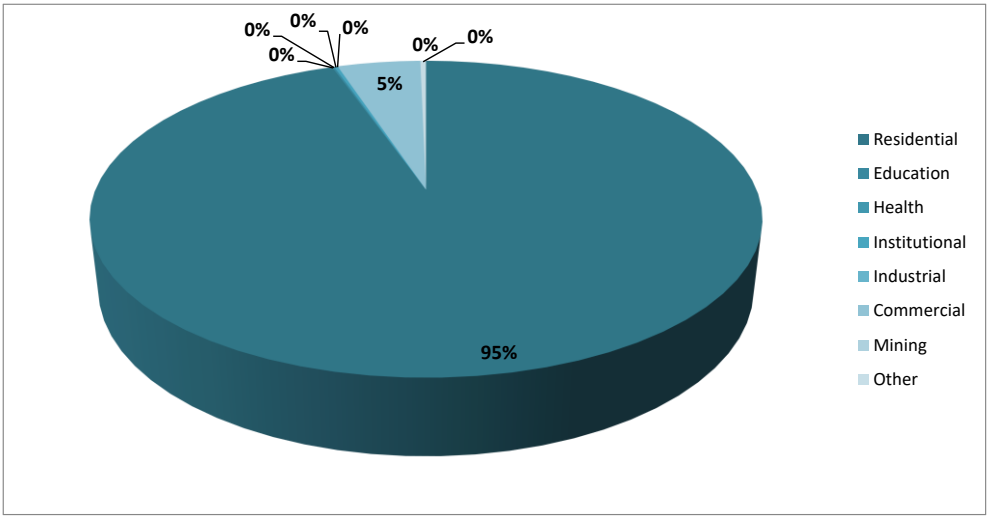


Figure C.2.1.2: User connection distribution for water – Year 2022/2023

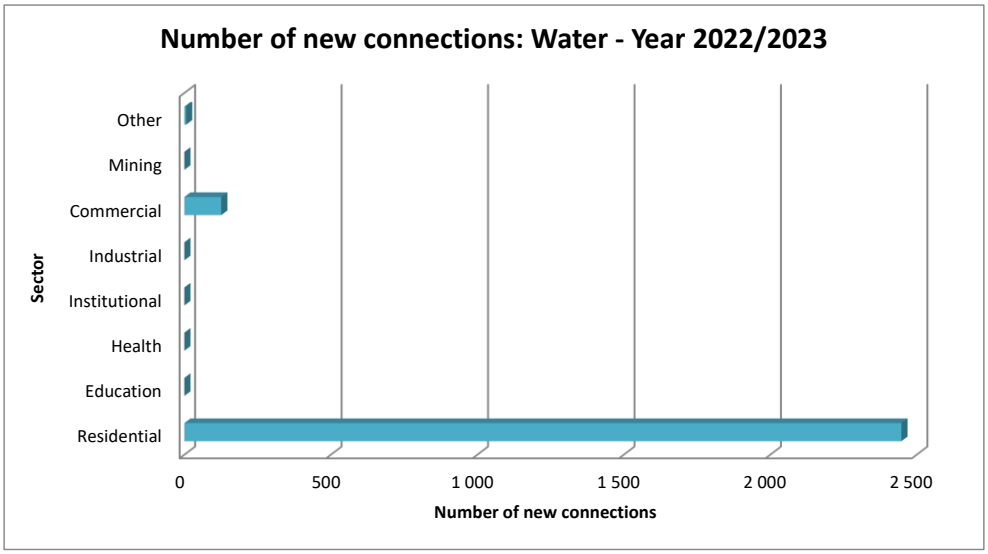


Figure C.2.1.3: Number of new water connections provided during 2022/2023

Table C.2.1.2: User Connection Profile (Wastewater Services)								
WSDP Ref. #	Category of users	Wastewater Services						
		Year 0 FY2022/23		Year - 1 FY2021/22		Year - 2 FY2020/21		New Connections Year 0 FY2022/23
		Nr	%	Nr	%	Nr	%	Nr
	RESIDENTIAL (DOMESTIC)							
3.3	Metered: Uncontrolled	37 291	77%	36 408	78%	35 822	77%	883
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0
	Unmetered (flat rate)	0	0%	0	0%	0	0%	0
	Communal water supply	8 502	18%	7 538	16%	8 242	18%	964
	Sub-Total: Residential	**45 793**	**95%**	**43 946**	**95%**	**44 064**	**95%**	**1 847**
	EDUCATION							
3.3	Schools	50	0%	50	0%	48	0%	0
	Tertiary educaton facilities	1	0%	1	0%	1	0%	0
	Sub-Total: Education	**51**	**0%**	**51**	**0%**	**49**	**0%**	**0**
	HEALTH							
3.3	Clinics	10	0%	10	0%	10	0%	0
3.3	Hospitals	3	0%	3	0%	3	0%	0
3.3	Health Centres	2	0%	2	0%	2	0%	0
	Sub-Total: Health	**15**	**0%**	**15**	**0%**	**15**	**0%**	**0**
	INSTITUTIONAL							
	Public Institutions (Governm./Sc)	77	0%	77	0%	79	0%	0
3.3	Magistrate Offices	1	0%	1	0%	1	0%	0
3.3	Police Stations	7	0%	7	0%	7	0%	0
3.3	Prisons	1	0%	1	0%	1	0%	0
	etc	0	0%	0	0%	0	0%	0
	Sub-Total: Institutional	**86**	**0%**	**86**	**0%**	**88**	**0%**	**0**
	INDUSTRIAL							
3.3	Dry industries (Incl. with Commercial)	0	0%	0	0%	0	0%	0
3.3	Wet industries	13	0%	13	0%	13	0%	0
	Sub-Total: Commercial	**13**	**0%**	**13**	**0%**	**13**	**0%**	**0**
	COMMERCIAL							
3.3	Businesses	2 087	4%	1 934	4%	1 812	4%	153
3.3	Office Buildings (Municipal Dep.)	209	0%	236	1%	249	1%	-27
	Sub-Total: Commercial	**2 296**	**5%**	**2 170**	**5%**	**2 061**	**4%**	**126**
	MINING							
		0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**
	OTHER							
	Agriculture: raw water	0	0%	0	0%	0	0%	0
	etc	158	0%	152	0%	149	0%	6
	Sub-Total: Other	**158**	**0%**	**152**	**0%**	**149**	**0%**	**6**
	TOTAL	**48 412**	**100%**	**46 433**	**100%**	**46 439**	**100%**	**1 979**

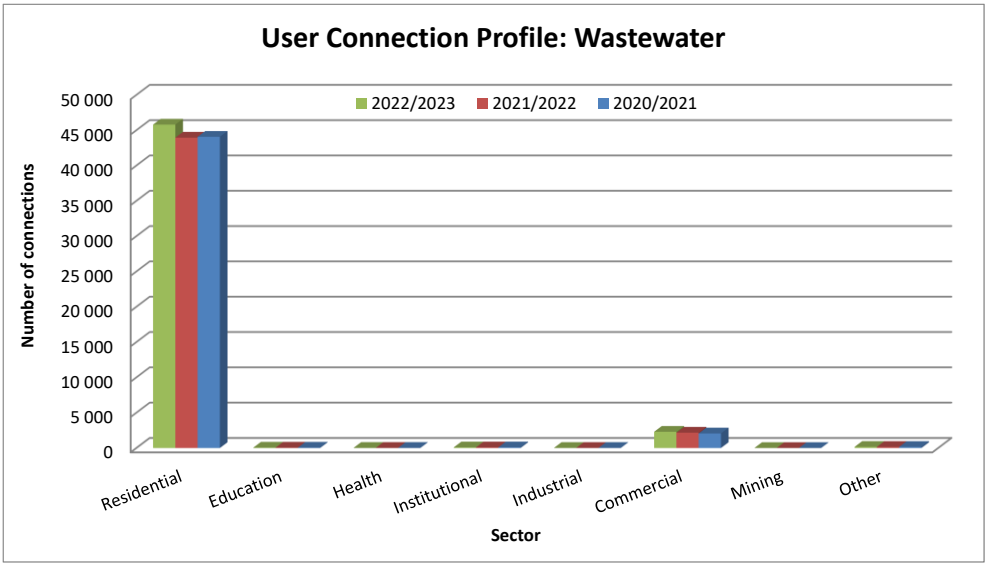


Figure C.2.1.4: User connection profile for wastewater

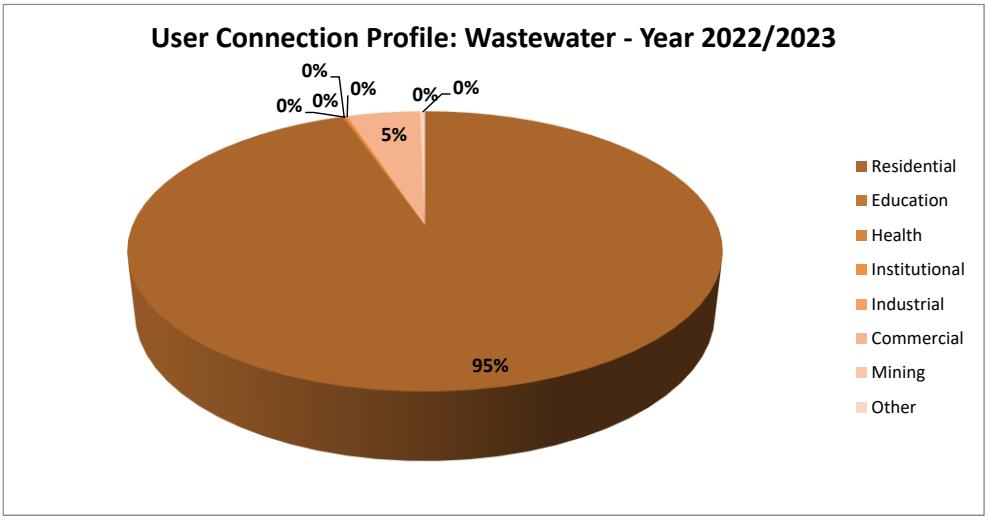


Figure C.2.1.5: User connection distribution for wastewater – Year 2022/2023

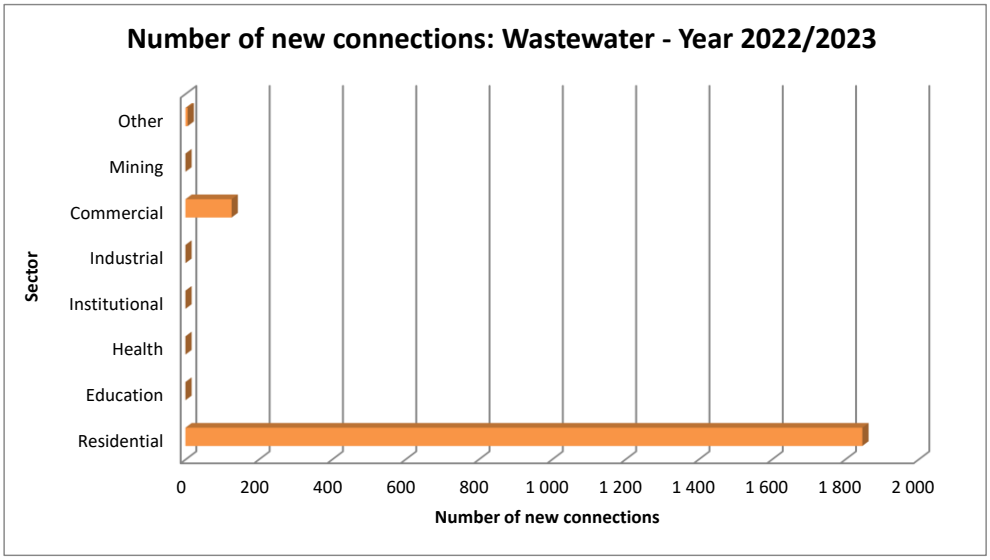


Figure C.2.1.6: Number of new wastewater connections provided during 2022/2023

The average annual growth in the number of consumers for George, Uniondale and Haarlem over the period 2012/2013 to 2022/2023, last ten financial years, was 1.79%. The number of user connections in each user sector, for the various distribution systems in George Municipality's Management Area, is as follows (Billed Metered Consumers from Financial System).

Table C.2.1.3: Number of user connections in each user sector for the George and Wilderness distribution system

Year	No of Household Consumer Units [1)]	No of Commercial Consumer Units [2)]	No of Industrial Consumer Units [3)]	No. of Other Consumer Units [4)]	Total	% Growth
2005/2006	23 049	1 223	17	323	**24 612**	-
2006/2007	24 744	1 311	18	325	**26 398**	7.26%
2007/2008	25 637	1 387	18	337	**27 379**	3.72%
2008/2009	26 235	1 425	18	346	**28 024**	2.36%
2009/2010	27 054	1 489	17	356	**28 916**	3.18%
2010/2011	28 046	1 531	18	377	**29 972**	3.65%
2011/2012	29 428	1 547	9	393	**31 377**	4.69%
2012/2013	29 778	1 559	2	373	**31 713**	1.07%
2013/2014	30 167	1 616	3	392	**32 178**	1.47%
2014/2015	30 572	1 642	4	533	**32 750**	1.78%
2015/2016	31 037	1 644	4	551	**33 236**	1.48%
2016/2017	31 633	1 660	4	583	**33 880**	1.94%
2017/2018	32 691	1 687	4	595	**34 977**	3.24%
2018/2019	33 376	1 712	4	579	**35 671**	1.98%
2019/2020	33 963	1 740	4	539	**36 246**	1.61%
2020/2021	34 317	1 752	4	540	**36 613**	1.01%
2021/2022	34 954	1 871	4	530	**37 359**	2.04%
2022/2023	35 773	2 011	5	508	**38 297**	2.51%

Notes: [1)] Tariff Categories: Indigent (1400), Household I (1401), Household N (1406), Herolds Bay (1422) and Apartment B (Blok)
[2)] Tariff Categories: Business I (1402)
[3)] Tariff Categories: Industrial (1404)
[4)] Tariff Categories: Sport Bodies (1403), Saasveld 3 (1410), Buitestedel (1413), Old Age K-Hu (1414), Governm./Sc (1415), Service Org (1417), Municipal Dep (1418) and Bulk Other (1419)

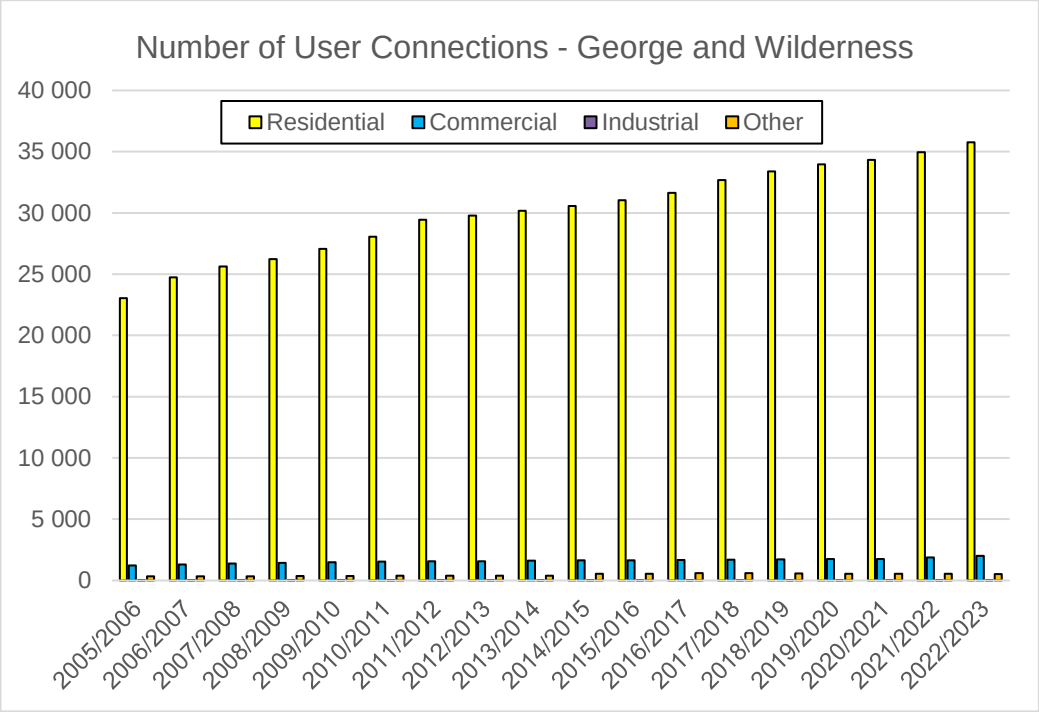


Figure C.2.1.7: Number of user connections in each user sector for George and Wilderness

Table C.2.1.4: Number of user connections in each user sector for the Uniondale distribution system					
Year	**No of Household Consumer Units [1)]**	**No of Commercial Consumer Units [2)]**	**No of School Consumer Units [3)]**	**No. of Church Consumer Units [4)]**	**Total**
2011/2012	897	39	5	13	**953**
2012/2013	818	41	3	12	**873**
2013/2014	824	42	2	13	**880**
2014/2015	955	48	2	13	**1 018**
2015/2016	823	54	2	14	**893**
2016/2017	867	55	2	14	**938**
2017/2018	986	57	2	14	**1 059**
2018/2019	988	59	2	14	**1 063**
2019/2020	992	59	2	14	**1 067**
2020/2021	994	59	2	14	**1 069**
2021/2022	951	62	2	14	**1 029**
2022/2023	1 008	73	2	14	**1 097**

Notes: [1)] Tariff Categories: Uniondale Ind Res (1450) and Uniondale Res (1451)
[2)] Tariff Categories: Uniondale Bus (1452) and Uniondale Municipal (1410)
[3)] Tariff Categories: Uniondale Schools (1454)
[4)] Tariff Categories: Uniondale Churches (1455)

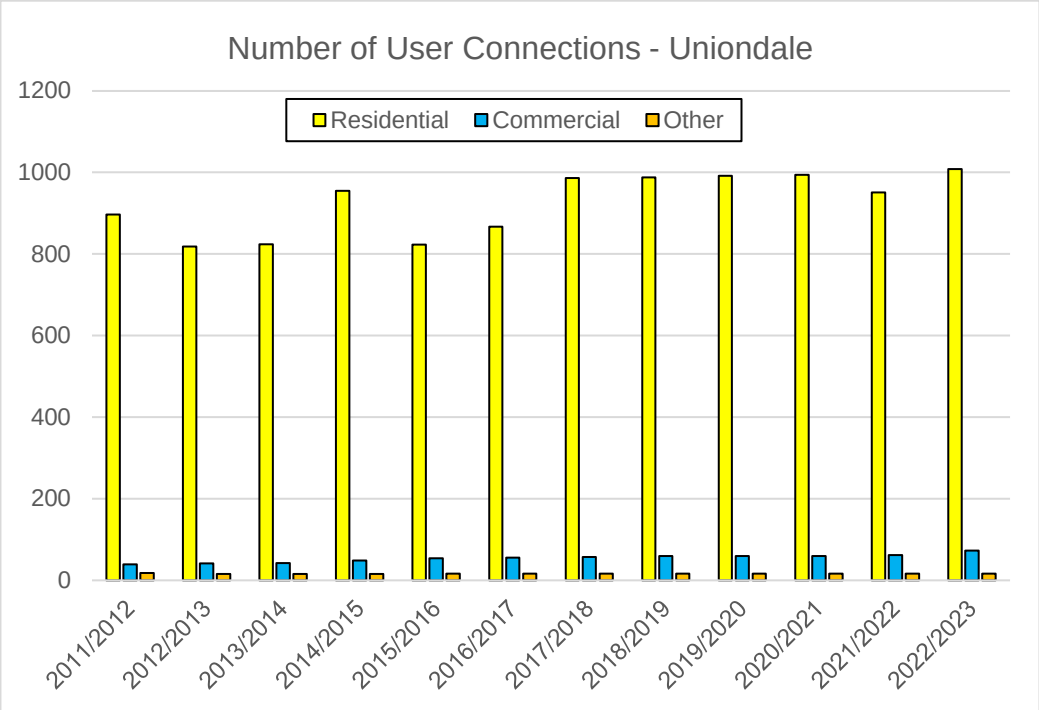


Figure C.2.1.8: Number of user connections in each user sector for Uniondale

Table C.2.1.5: Number of user connections in each user sector for the Haarlem distribution system					
Year	**No of Household Consumer Units [1)]**	**No of Commercial Consumer Units [2)]**	**No of School Consumer Units [3)]**	**No. of Church Consumer Units [4)]**	**Total**
2011/2012	501	1	1	4	**507**
2012/2013	483	2	0	4	**489**
2013/2014	473	2	1	2	**478**
2014/2015	372	2	1	2	**377**
2015/2016	510	1	1	2	**514**
2016/2017	490	1	1	2	**494**
2017/2018	490	1	1	2	**494**
2018/2019	505	1	1	2	**509**
2019/2020	508	1	1	2	**512**
2020/2021	511	1	1	2	**515**

Table C.2.1.5: Number of user connections in each user sector for the Haarlem distribution system					
Year	No of Household Consumer Units [1]	No of Commercial Consumer Units [2]	No of School Consumer Units [3]	No. of Church Consumer Units [4]	Total
2021/2022	503	1	1	2	**507**
2022/2023	510	3	1	2	**516**

Notes: [1] Tariff Categories: Haarlem Ind Res (1470) and Haarlem Res (1471)
[2] Tariff Categories: Haarlem Bus (1472)
[3] Tariff Categories: Haarlem Schools (1474)
[4] Tariff Categories: Haarlem Churches (1475)

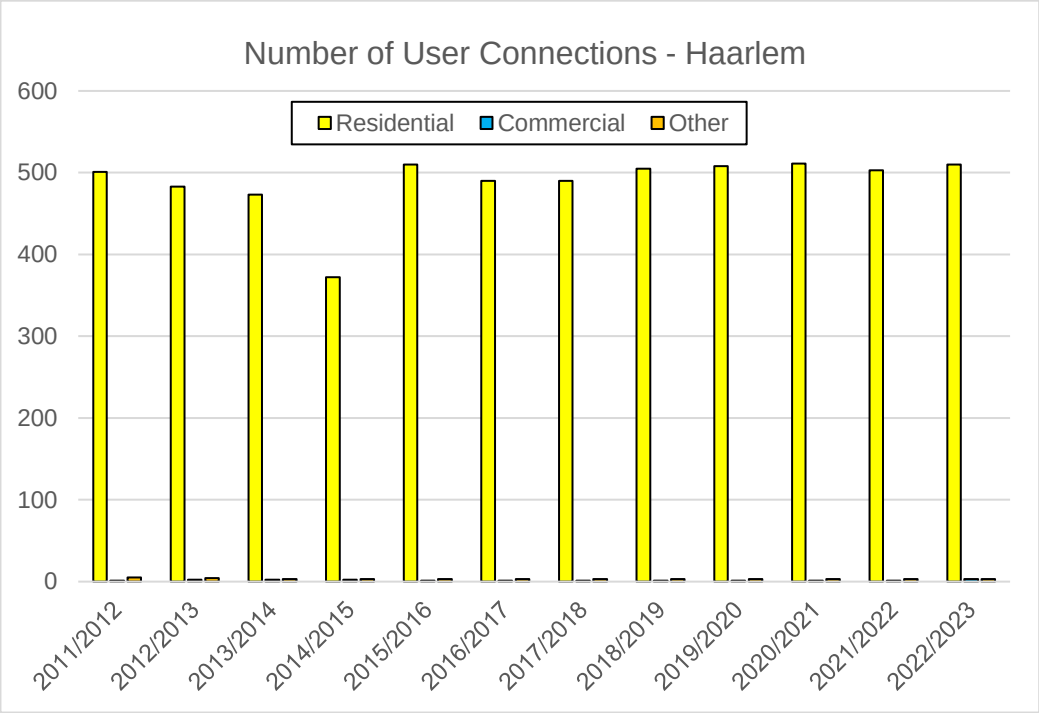


Figure C.2.1.9: Number of user connections in each user sector for Haarlem

A Swift Analysis was done for June 2023 for George Municipality. The number of meters, connections and stands for the various categories are summarised in the table below.

Table C.2.1.6: Swift analysis for George Municipality (June 2023)						
Category	Meters	Connections	Number of Stands			
			Estimated Supply	Metered Supply	Vacant Stands	Total Stands
Business Commercial	1 312	1 329	19	1 056	533	1 608
Cluster	0	114	114	0	8	122
Education	114	115	1	80	6	87
External	0	0	0	0	0	0
Farm Area	260	262	2	220	90	312
Flats	0	2	2	0	4	6
Government Institutions	66	66	0	48	6	54
Ignore	0	0	0	0	0	0
Industrial	696	706	10	526	235	771
Informal	65	83	83	0	22	105
Housing	0	0	0	0	0	0
No category	0	0	0	0	0	0
Other	244	254	11	194	89	294
Parks	0	13	13	0	74	87
Residential 500m²	21 980	26 541	4 607	21 274	5 026	30 907

Table C.2.1.6: Swift analysis for George Municipality (June 2023)						
Category	Meters	Connections	Number of Stands			
			Estimated Supply	Metered Supply	Vacant Stands	Total Stands
Residential 1 000m²	9 227	9 621	398	8 961	2 491	11 850
Residential 1 500m²	3 881	4 071	191	3 735	900	4 826
Residential 2 000m²	719	749	31	667	387	1 085
Residential > 2 000m²	1 782	1 855	75	1 514	5 912	7 501
Servitude	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	**40 346**	**45 781**	**5 557**	**38 275**	**15 783**	**59 615**

C.2.2. Residential Water Services Delivery Access Profile

The table below gives an overview of the water services delivery access profile of George Municipality.

Table C.2.2.1: Residential Water Services Delivery Access Profile: Water							
Census Category	Description	Year 0 FY2022/23		Year - 1 FY2021/22		Year - 2 FY2020/21	
		Nr	%	Nr	%	Nr	%
	WATER (ABOVE MIN LEVEL)						
Piped (tap) water inside dwelling/institution	House connections	41 556	58%	40 541	58%	39 826	59%
Piped (tap) water inside yard	Yard connections (Incl. Backyard Dwellers)	20 365	28%	20 455	29%	18 671	27%
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	Standpipe connection < 200 m	8 395	12%	6 830	10%	6 640	10%
	Sub-Total: Minimum Serivce Level and Above	**70 316**	**98%**	**67 826**	**97%**	**65 137**	**96%**
	WATER (BELOW MIN LEVEL)						
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	Standpipe connection: > 200 m < 500 m	74	0%	74	0%	74	0%
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	Standpipe connection: > 500 m < 1 000 m	27	0%	27	0%	27	0%
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	Standpipe connection: > 1 000 m	19	0%	19	0%	19	0%
No access to piped (tap) water	No services	1 330	2%	1 931	3%	2 783	4%
	Sub-Total: Below Minimum Service Level	**1 450**	**2%**	**2 051**	**3%**	**2 903**	**4%**
	Total number of households	**71 766**	**100%**	**69 877**	**100%**	**68 040**	**100%**

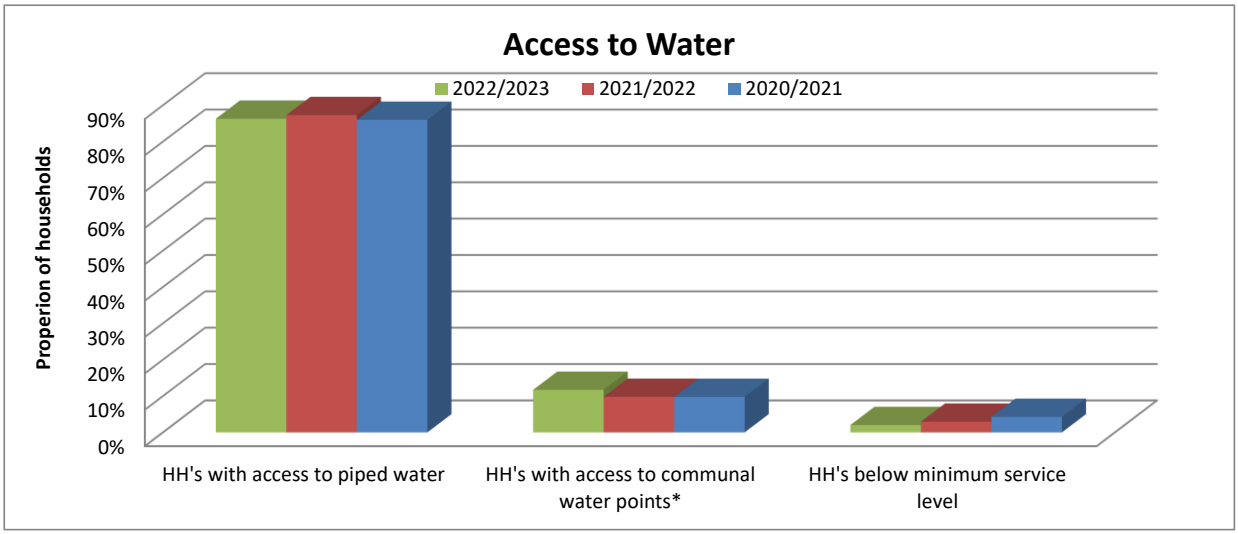


Figure C.2.2.1: Household water access profile

The existing residential water service levels in George Municipality's Management Area are estimated as follows (June 2023).

Table C2.2.2: Residential water service levels					
Service Level	**George and Wilderness**	**Uniondale**	**Haarlem**	**Farms**	**Total**
No Water Services	0	0	0	767 [3)]	767
Below RDP: Infrastructure Upgrade	0	0	0	0	0
Below RDP: Infrastructure Extension	0	0	0	120 [4)]	120
Below RDP: Infrastructure Refurbishment	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0
Total Basic Need (RDP)	**0**	**0**	**0**	**887**	**887**
Below Housing Interim [5)]	3 471	0	18	188	3 677
Adequate Housing Permanent [6)]	5 219	22	0	40	5 281
Total Housing Need	**8 690**	**22**	**18**	**228**	**8 958**
Standpipes	0	0	0	0	0
Yard Connections [7)]	18 452	437	138	1 338	20 365
House Connections	35 773 [2)]	1 008 [2)]	510 [2)]	4 265	41 556
Total Adequate	**54 225**	**1 445**	**648**	**5 603**	**61 921**
Total	**62 915**	**1 467**	**666**	**6 718**	**71 766**

Notes:
1) There are no households on formal erven in the urban areas with existing water service levels below RDP standard.
2) George / Wilderness, Uniondale and Haarlem: Average number of residential consumer units for 2022/2023, as calculated from the Financial Records.
3) Census 2011: Number of households with no access to piped (tap) water in rural areas (995 – 228 = 767).
4) Census 2011: Number of households with communal services in rural areas (200m – 500m) 74, (500m – 1000m) 27 and (>1000m) 19.
5) Below Housing Interim in the above table is the number of households in informal areas with no communal taps or with communal taps at a ratio above one communal tap for every twenty-five households, which was confirmed by the Housing Department.
6) Adequate Housing Permanent in the above table is the number of households in informal areas with communal water services at a ratio of at least one communal tap for every twenty-five households. Number of households with communal services in informal areas was confirmed by the Housing Department.
7) Estimated number of backyard dwellers on formal erven in the urban areas, which was calculated from the 2022/2023 projected number of households (Projected number of households – Number of households in informal areas – Number of residential consumer units).

The table below gives an overview of the sanitation services delivery access profile of George Municipality.

Table C.2.2.3: Residential Water Services Delivery Access Profile: Sanitation

Census Category	Description	Year 0 FY2022/23		Year - 1 FY2021/22		Year - 2 FY2020/21	
		Nr	%	Nr	%	Nr	%
	SANITATION (ABOVE MIN LEVEL)						
Flush toilet (connected to sewerage system)	Waterborne	54 688	76%	53 895	77%	51 525	76%
	Waterborne: Low Flush	0	0%	0	0%	0	0%
Flush toilet (with septic tank)	Septic tanks / Conservancy	6 101	9%	5 969	9%	5 840	9%
Chemical toilet	Non-waterborne (above min. service level)	18	0%	18	0%	18	0%
Pit toilet with ventilation (VIP)		811	1%	811	1%	811	1%
Other		8 284	12%	7 726	11%	8 430	12%
	Sub-Total: Minimum Serivce Level and Above	**69 902**	**97%**	**68 419**	**98%**	**66 624**	**98%**
	SANITATION (BELOW MIN LEVEL)						
Pit toilet without ventilation	Pit toilet	655	1%	655	1%	655	1%
Bucket toilet	Bucket toilet	155	0%	155	0%	155	0%
Other toilet provision (below min. service level	Other	157	0%	157	0%	157	0%
No toilet provisions	No services	897	1%	491	1%	270	0%
	Sub-Total: Below Minimum Service Level	**1 864**	**3%**	**1 458**	**2%**	**1 237**	**2%**
	Total number of households	**71 766**	**100%**	**69 877**	**100%**	**67 861**	**100%**

Note: The number of households with buckets in the above table is still based on the 2011 Census data for the farms in the rural areas, which can only be updated once the new 2022 Census data becomes available.

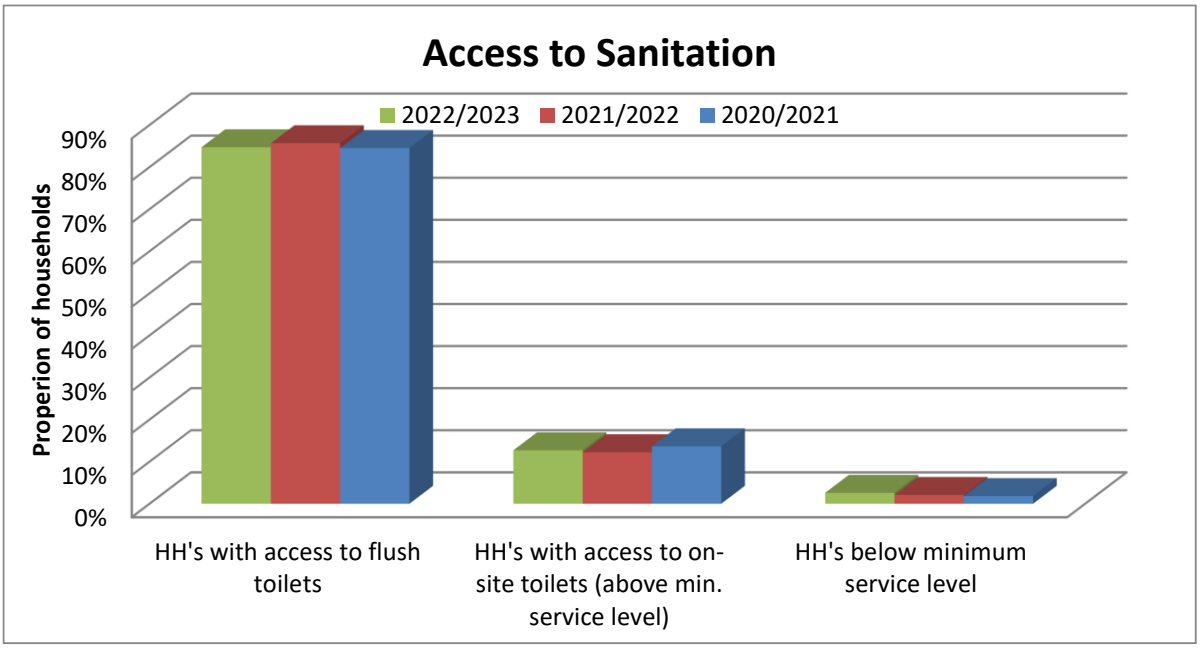


Figure C.2.2.2: Household sanitation access profile

The existing sanitation service levels in George Municipality's Management Area are estimated as follows (June 2023).

Table C.2.2.4: Residential sanitation service levels

Service Levels	George and Wilderness	Uniondale	Haarlem	Farms	Total
No Sanitation Services	0	0	0	223 [3)]	223
Below RDP: Infrastructure Upgrade	0	0	0	985 [4)]	985
Below RDP: Infrastructure Extension	0	0	0	0	0
Below RDP: Infrastructure Refurbishment	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0
Total Basic Need (RDP)	**0**	**0**	**0**	**1 208**	**1 208**
Below Housing Interim [6)]	3 867	0	0	40	3 907
Adequate Housing Permanent [7)]	4 823	22	18	188	5 051
Total Housing Need	**8 690**	**22**	**18**	**228**	**8 958**
Non-Waterborne	0	0	0	811 [5)]	811
Waterborne Low Flush	0	0	0	0	0
Septic Tanks / Conservancy	1 381[1)]	165 [1)]	84[1)]	4 471	6 101
Waterborne WWTW [2)]	52 844	1 280	564	0	54 688
Total Adequate	**54 225**	**1 445**	**648**	**5 282**	**61 600**
Total	**62 915**	**1 467**	**666**	**6 718**	**71 766**

Notes:
1) Septic Tanks as taken from 2011 Census data.
2) Include Backyard dwellers
3) Census 2011: Number of households with no toilet facility (451 – 228 = 223)
4) Census 2011: Number of households with existing buckets 155, chemical toilets 18, pit toilets without ventilation 655 and "other" 157
5) Census 2011: Number of households with pit toilets with ventilation 811.
6) Below Housing Interim in the above table is the number of households in informal areas with no communal toilet facilities or with communal toilet facilities at a ratio above one communal toilet for every five households, which was confirmed by the Housing Department.
7) Adequate Housing Permanent in the above table is the number of households in informal areas with communal ablution facilities at a ratio of at least one communal toilet for every five households. Number of households with communal services in informal areas was confirmed by the Housing Department.

Number of households provided with water through communal water services:

The National Norms and Standards for Domestic Water and Sanitation Services, as published in the Government Gazette No.41100 of 8 September 2017, include the following interim water and sanitation services:

Table C.2.2.5: Interim water and sanitation services (National Norms and Standards for Domestic Water and Sanitation Services)
Intermittent provision of water at a minimum level of water supply services
• A minimum volume of 1 500 litres of potable water shall be made available to a household per week.
• The water provided shall comply with the SANS241 quality standards.
• The access/delivery point shall be at a minimum a communal standpipe, or a storage facility in the yard (water container, yard tank, roof tank) of at least a volume of 1 500 litres.
• In the case of a communal standpipe, it shall be within a reasonable walking distance of no more than 100m from the farthest household.
• In the case of a storage facility in the yard (water container, yard tank, roof tank), it shall be refilled by a water tanker with potable water at least once a week.
• The water shall be made available for 52 weeks per year.
• All water use and/or supply shall be metered, but not tariffed.

Table C.2.2.5: Interim water and sanitation services (National Norms and Standards for Domestic Water and Sanitation Services)
Intermittent provision of water at a minimum level of water supply services
• Maintenance of the infrastructure for this level of service is the responsibility of the WSA. • Point-of-use water treatment systems and methods shall be advocated. • Efforts shall be made to ensure user acceptance and understanding for this level of service. • Users shall be educated in effective water use and hygiene. • This level of service shall be phased out by 2030 to comply with the National Development Plan's requirement of providing a basic service of at least a yard connection for water.
Interim sanitation services (Communal and shared facilities)

• Users shall be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used.
• Plumbing in and for communal and shared facilities needs to be more robust than that installed on private premises, and shall comply with the general principles of the National Building Regulations. Precautions need to be taken in the design against vandalism, theft and misuse.
• Efforts shall be made to provide people living with chronic illnesses, such as HIV and AIDS, with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.
• Where possible, communal and shared toilets must be provided with lighting, or users provided with torches. The input of the users must be sought with regard to ways of enhancing the safety of users.
• Efforts to build a sense of communal ownership and pride of possession shall be made so that cooperation is voluntarily given or assured by peer pressure.
• Sufficient sanitation facilities shall be provided for the number of users
  ➢ Communal toilet: Toilet seats – 1 seat per 50 users; Urinal units – 1 unit per 100 users; Hand washing – 1 basin per 10 toilet seats.
  ➢ Shared toilet mostly used all the time: Toilet seats – 1 seat per 20 users; Urinal units – 1 unit per 50 users; Hand washing – 1 basin per 4 toilet seats.
• Shared and communal facilities shall have separate toilet blocks for men and women with separate entries; waste bins with lids in toilet block for women – emptied once a week and disposed of appropriately; urinal facilities for men; seats for children in the section for women; waiting / circulating area; separate washing cubicles for men and women; facility to store large volumes of water (water-borne sanitation); appropriate wastewater disposal system; and store room for keeping the cleaning material / equipment.

The current number of households in the informal areas, as provided by the housing department is 8 730. The Municipality's target, with regard to the provision of communal services in informal areas, is to ensure that at least one toilet is provided for every five (5) households and one tap for every twenty-five (25) households. There are 3 489 households with communal water services above the ratio of one tap for every twenty-five households and 3 867 households with communal toilet facilities above the ratio of one toilet for every five households. An additional 784 communal toilets and 149 communal taps are required in order to ensure compliance with the communal service level targets for the informal areas. The table below gives a summary of the communal services levels in the informal areas in George Municipality's urban areas.

Table C.2.2.6: Sanitation and Water communal service levels in the informal areas

Informal Area	Sanitation Services					Water Services				Number of existing informal Households
	Flush Toilets	Chemical Toilets	No. of HH / Facility	Backlog		Stand Pipes	No. of HH / Facility	Backlog		
				HH	Toilets			HH	Taps	
France (Old Portion)	35	4	4.8	-	-	4	47.0	88	4	188
France New Portion	0	50	9.6	232	47	15	32.1	107	5	482
All Bricks (Old Portion)	17	3	18.4	268	54	5	73.6	243	10	368
Mandela Village	0	171	8.1	531	107	8	173.3	1 186	48	1386
Edameni	0	32	8.9	126	26	10	28.6	36	2	286
Botswana	0	40	11.2	248	50	26	17.2	-	-	448
New Valley	0	0	0.0	606	122	15	40.4	231	10	606
Absa	0	2	42.0	74	15	0	0.0	84	4	84
Kwanorushe (Erf 5088)	23	0	3.2	-	-	6	12.2	-	-	73
Styebi-styebi	16	10	12.2	187	38	4	79.3	217	9	317
Edongweni	7	1	28.5	188	38	2	114.0	178	8	228
Emdywadeni	23	0	6.2	28	6	9	15.9	-	-	143
Telkom (old)	5	10	4.3	-	-	4	16.3	-	-	65
Telkom (New)	0	0	0.0	28	6	2	14.0	-	-	28
Ikapa	12	1	3.7	-	-	2	24.0	-	-	48

Table C.2.2.6: Sanitation and Water communal service levels in the informal areas

Informal Area	Sanitation Services					Water Services				Number of existing informal Households
	Flush Toilets	Chemical Toilets	No. of HH / Facility	Backlog		Stand Pipes	No. of HH / Facility	Backlog		
				HH	Toilets			HH	Taps	
Blondie	3	0	5.7	2	1	2	8.5	-	-	17
Dube	0	22	14.5	209	42	6	53.2	169	7	319
Tsunami	39	1	6.3	50	10	10	25.0	-	-	250
Ramaphosa	23	5	3.0	-	-	10	8.4	-	-	84
Asazani (Nyamaland)	0	16	4.3	-	-	7	9.7	-	-	68
Riverside(Happy Valley)	0	5	54.2	246	50	0	0.0	271	11	271
Genesis	16	9	12.2	180	36	11	27.7	30	2	305
Bhekela	0	20	17.8	255	51	9	39.4	130	6	355
California	10	1	18.5	148	30	4	50.8	103	5	203
Red Cross	8	10	3.9	-	-	3	23.3	-	-	70
Robben Island	9	65	6.4	101	21	5	94.2	346	14	471
Emnandi	0	28	8.9	110	22	8	31.3	50	2	250
July Markeni	3	0	3.0	-	-	2	4.5	-	-	9
Mgoqi Street	3	0	3.3	-	-	1	10.0	-	-	10
Florence Ntondini	2	0	1.0	-	-	2	1.0	-	-	2
Erf 181	1	4	3.0	-	-	1	15.0	-	-	15
Mingo Kamp	0	5	1.8	-	-	1	9.0	-	-	9
Noord Straat	1	0	8.0	3	1	1	8.0	-	-	8
Kloof Straat	2	0	6.0	2	1	1	12.0	-	-	12
Moeggeploeg (Bluegum 2732)	14	0	4.8	-	-	4	16.8	-	-	67
Moeggehuur (Houtkapper 5266)	13	0	4.5	-	-	9	6.4	-	-	58
Katdoring	0	9	5.1	1	1	2	23.0	-	-	46
Voelnesvaring-Erf 5408	0	2	4.5	-	-	2	4.5	-	-	9
Crotonslot	6	0	9.2	25	5	6	9.2	-	-	55
Skaapkopvallei	6	0	4.7	-	-	5	5.6	-	-	28
Rosedale	0	106	1.5	-	-	20	7.9	-	-	158
Syferfontein	0	137	1.3	-	-	22	8.1	-	-	177
Conville	2	0	3.5	-	-	3	2.3	-	-	7
Circular Drive	10	2	2.8	-	-	19	1.7	-	-	33
Saturnus Street	12	1	1.8	-	-	4	6.0	-	-	24
Protea Park	15	0	2.1	-	-	10	3.1	-	-	31
Spandiel Street (Rosemoor)	5	3	3.4	-	-	7	3.9	-	-	27
Erf 4200 (Palana)	7	1	2.8	-	-	2	11.0	-	-	22
Spandiel Street	27	6	1.9	-	-	5	12.6	-	-	63
Figland Street	5	4	3.0	-	-	5	5.4	-	-	27
Nel Street	6	0	2.3	-	-	7	2.0	-	-	14
Sunset Close	2	0	4.5	-	-	1	9.0	-	-	9
Malgas River	6	0	4.5	-	-	6	4.5	-	-	27
Erf 1424	4	0	0.5	-	-	0	0.0	2	1	2
Sonop Avenue	2	0	2.0	-	-	1	4.0	-	-	4
Golden Valley	9	0	3.1	-	-	4	7.0	-	-	28
Wilderness Heights (Erf 329)	0	30	3.7	-	-	21	5.3	-	-	112
Kleinkrantz	27	0	3.7	-	-	38	2.6	-	-	100
Touwsranten	13	0	6.5	19	4	13	6.5	-	-	84
Uniondale	11	0	2.0	-	-	7	3.1	-	-	22
Haarlem	4	0	4.5	-	-	0	0.0	18	1	18
Total	**464**	**816**	**6.8**	**3 867**	**784**	**419**	**20.8**	**3 489**	**149**	**8 730**

Notes: No Services, Ratios above Targets, Ratios meeting Targets

Targets: George Municipality works towards a ratio of at least 1 tap per twenty-five households and 1 communal toilet per five households for their shared services.

All the schools and tertiary education facilities in George Municipality's urban areas are provided with adequate water and sanitation services and there is no backlog with regard to water and sanitation services. The existing water and sanitation service levels for all the schools in George Municipality's Management Area is summarised in the table below.

Table C.2.2.7: Service Levels at Schools

Associated Services Facility	Number of Facilities	Water			Sanitation		
		Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services	Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services
Schools	50	50	0	0	50	0	0

Source: George Socio-Economic Profile, Provincial Treasury, 2022 for the number of schools

All the medical facilities in George Municipality's Management Area are provided with adequate water and sanitation services and there is no backlog with regard to water and sanitation services. The existing water and sanitation service levels for all the Medical Facilities in George Municipality's Management Area is summarised in the table below.

Table C.2.2.8: Service Levels at Medical Facilities

Associated Services Facility	Number of Facilities	Water			Sanitation		
		Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services	Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services
Hospitals	3	3	0	0	3	0	0
Health Centres	2	2	0	0	2	0	0
Clinics	10	10	0	0	10	0	0
Satellite Clinics	4	4	0	0	4	0	0

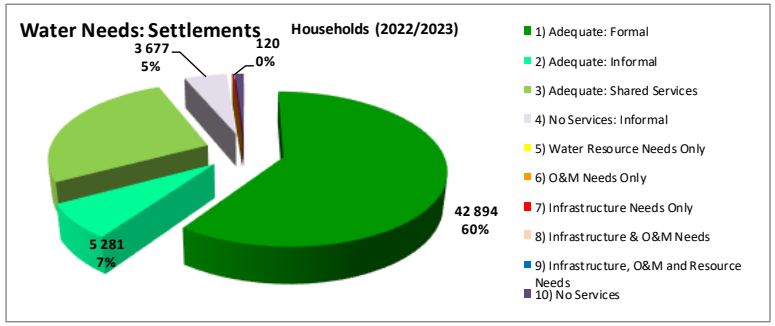
Source: George Socio-Economic Profile, Provincial Treasury, 2022 for the number of medical facilities.

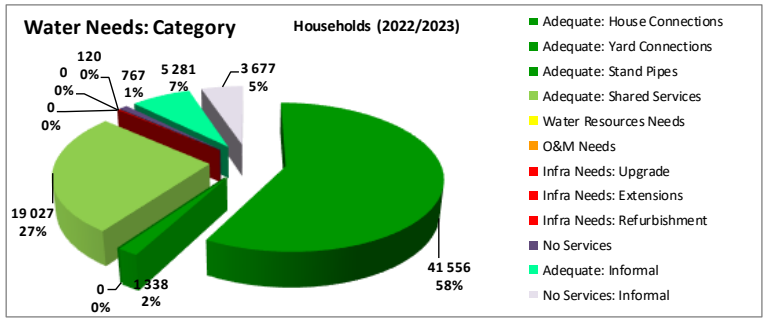
C.2.3. Residential Water Services Delivery Adequacy Profile

The existing residential water service levels in George Municipality's Management Area are estimated as follows.

Table C.2.3.1: Residential Water Services Ddelivery Adequacy Profile (Water)

Water Categorisation	Number of settlements	FORMAL																		INFORMAL			
		Adequate								Water Resource needs		O & M Needs		Infrastructure Needs						No services		Adequate		No services	
		House Connections		Yard Connections		Stand Pipes		Shared Services						Upgrades		Extensions		Refurbishment							
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	37	41 556	100%	1 338	100%																				
2	31																					5 281	100%		
3	10							19 027	100%																
4	18																							3 677	100%
5	0																								
6	0																								
7	3															120	100%								
8	0																								
9	0																								
10	3																			767	100%				
Total Household Interventions required		41 556		1 338		0		19 027		0		0		0		120		0		767		5 281		3 677	



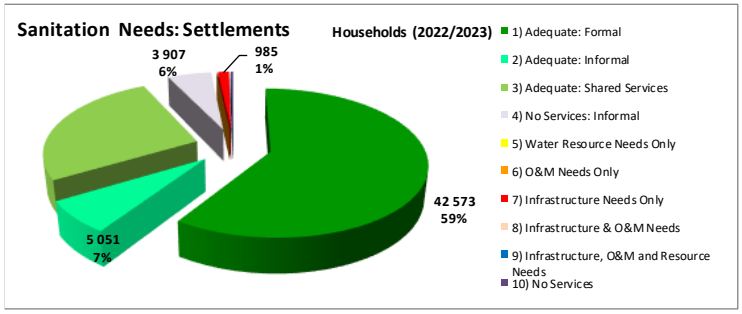


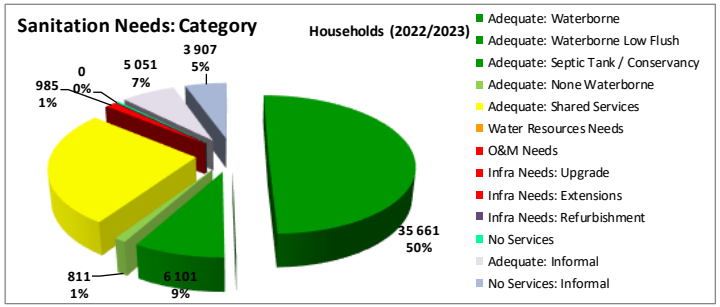
1	Adequate	3	Adequate: Shared services	5	Water Resources Needs **Only**	7	Infrastructure Needs **Only**	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs **Only**	8	Infrastructure& O&M needs	10	No Services

The existing residential sanitation service levels in George Municipality's Management Area are estimated as follows.

Table C.2.3.2: Residential Water Services Delivery Adequacy Profile (Sanitation)

Water Categorisation	Number of settlements	FORMAL																				INFORMAL			
		Adequate										Water Resource needs		O & M Needs		Infrastructure Needs						No services		Adequate		No services	
		Waterborne		Waterborne Low flush		Septic Tank/ Conservancy		None Waterborne		Shared Services						Upgrades		Extensions		Refurbishment							
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	37	35 661	100%			6 101	100%	811	100%																		
2	31																							5 051	100%		
3	10									19 027	100%																
4	23																									3 907	100%
5	0																										
6	0																										
7	3															985	100%										
8	0																										
9	0																										
10	3																					223	100%				
Total Household Interventions required		35 661		0		6 101		811		19 027		0		0		985		0		0		223		5 051		3 907	





1	Adequate	3	Adequate: Shared services	5	Water Resources Needs **Only**	7	Infrastructure Needs **Only**	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs **Only**	8	Infrastructure& O&M needs	10	No Services

C.3. Cost Recovery and Free Basic Services

C.3.1. Tariffs

The water tariff structures for George Municipality for the 2022/2023 financial year and the previous four financial years are summarised in the table below (Subject to VAT).

Table C.3.1.1: Water tariffs for George and Wilderness for the last five financial years

Consumer/Description (Tariff Code)	Category	22/23	21/22	20/21	19/20	18/19
Rising Block Tariffs are applicable to all consumers excluding: 1) Schools, Colleges, Technikons and Universities 2) Children's Homes 3) Crèches 4) Sport Bodies 5) Old Age Homes 6) Nelson Mandela Campus at Saasveld 7) Churches and Church Buildings 8) Welfare Organizations 9) Municipal Directorates						
Block Tariff: Basic Tariff per meter per month, or where more than one consumer is served through the same meter, cost per consumer per month		-	R100-91	R95-20	R89-81	R84-73
Block Tariff: Basic Tariff per meter per month, or where more than one consumer is served through the same meter, cost per consumer per month	Domestic households	R111-00	-	-	-	-
	Block of flats, Educational Institutions	R300-40	-	-	-	-
	Industries/Businesses, Guest houses and Bed-and-Breakfast concerns, children's and Old Age Homes / Crèches, Churches and Church Buildings	R195-10	-	-	-	-
Block Tariff: Domestic and Domestic Indigent (1400, 1401)	0 – 6 Kl	R0-00	R0-00	R0-00	R0-00	R0-00
	>6 – 15 Kl	R19-44	R17-67	R16-67	R15-73	R14-84
	>15 – 20 Kl	R22-40	R20-36	R19-21	R18-12	R17-09
	>20 – 30 Kl	R29-11	R26-46	R24-96	R23-55	R20-48
	>30 – 50 Kl	R36-48	R33-16	R31-28	R29-51	R24-59
	>50 Kl	-	R39-38	R37-15	R35-05	R28-04
	>50 Kl – 100Kl	R44-98	-	-	-	-
	>100 Kl	R76-67	-	-	-	-
Block Tariff: Industries / Businesses with consumption < 100 kl per day (1402)	0 – 6 Kl	R14-48	R17-67	R16-67	R15-73	R14-84
	>6 – 15 Kl	R17-04	R17-67	R16-67	R15-73	R14-84
	>15 – 20 Kl	R22-83	R20-36	R19-21	R18-12	R17-09
	>20 – 30 Kl	R27-50	R24-39	R23-01	R21-71	R20-48
	>30 – 50 Kl	R29-50	R26-77	R25-25	R23-82	R22-47
	>50 Kl	-	R29-29	R27-63	R26-07	R24-59
	>50 Kl – 100Kl	R32-25	-	-	-	-

Table C.3.1.1: Water tariffs for George and Wilderness for the last five financial years						
Consumer/Description (Tariff Code)	**Category**	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
	>100 Kl	R32-25	-	-	-	-
Block Tariff: Guest houses and Bed-and-Breakfast concerns (1405)	0 – 6 Kl	R14-48	-	-	-	-
	>6 – 15 Kl	R17-04	-	-	-	-
	>15 – 20 Kl	R22-83	-	-	-	-
	>20 – 30 Kl	R27-50	-	-	-	-
	>30 – 50 Kl	R29-50	-	-	-	-
	>50 Kl – 100Kl	R32-25	-	-	-	-
	>100 Kl	R32-25	-	-	-	-
Block Tariff: Children's and Old Age Homes / Crèches (1414) Schools, Colleges, Technikons and Universities (1415) Churches and Church Buildings (1419)	0 – 6 Kl	R16-87	-	-	-	-
	>6 – 15 Kl	R17-04	-	-	-	-
	>15 – 20 Kl	R17-38	-	-	-	-
	>20 – 30 Kl	R17-55	-	-	-	-
	>30 – 50 Kl	R17-89	-	-	-	-
	>50 Kl – 100Kl	R18-57	-	-	-	-
	>100 Kl	R20-45	-	-	-	-
Sport Bodies (1403)	Minimum charge per meter per month	R300-40	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	R17-04	R17-67	R16-67	R15-73	R14-84
Industries and businesses with a consumption of > 100 kl per day (1404)	Minimum charge per meter per month	R300-40	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	R17-04	R19-46	R18-36	R17-32	R16-34
Domestic consumers with no meter (1406)	Minimum charge per household per month	R133-00	R100-91	R95-20	R89-81	R84-73
Children's and Old Age Homes / Crèches (1414)	Minimum charge	-	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	-	R17-67	R16-67	R15-73	R14-84
Schools, Colleges, Technikons and Universities (1415)	Minimum charge	-	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	-	R17-67	R16-67	R15-73	R14-84
Sports fields and facilities (1416)	Minimum charge	R300-40	-	-	-	-
	Water consumption per Kl	R17-04	R17-67	R16-67	R15-73	R14-84
Welfare organizations (1417)	Minimum charge	R300-40	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	R17-04	R17-67	R16-67	R15-73	R14-84
Municipal Directorates, including Garden Route Botanical Garden (1410, 1418)	Minimum charge	R300-40	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	R17-04	R17-67	R16-67	R15-73	R14-84

Table C.3.1.1: Water tariffs for George and Wilderness for the last five financial years						
Consumer/Description (Tariff Code)	**Category**	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
Churches and Church Buildings (1419)	Minimum charge	-	R213-13	R201-07	R189-69	R178-95
	Water consumption per Kl	-	R17-67	R16-67	R15-73	R14-84
Delivery of water with a tanker	Delivery costs per 8 Kl or part thereof	R830-56	R755-05	R712-31	R671-99	R633-95
	Cost of water per 1 Kl	R19-44	R17-67	R16-67	R15-73	R14-84
Connection Fees	For a 20mm connection	R3 291-39	R2 992-17	R2 933-91	R2 793-91	R2 660-87
	For a 20mm connection where only a water meter is supplied	R2 323-39	R2 112-17	R2 070-43	R1 972-17	R1 878-26
	For a 25mm connection	R5 349-33	R4 863-48	R4 767-83	R4 540-87	R4 324-35
	For a 40mm connection	R12 498-87	R11 362-61	R11 140-00	R10 609-57	R10 104-35
	For a 50mm connection	R13 344-00	R13 040-00	R12 784-35	R12 175-65	R11 595-65
	Connections larger than 50mm	Actual cost + 10% Admin costs	Actual cost + 10% Admin costs	R20 420-87	R19 448-70	R18 522-61
Testing of meters	Cost per meter on request of an owner	R406-02	R369-11	R361-87	R344-64	R328-23
Special meter readings	Office hours	R147-22	R133-84	R131-22	R124-97	R119-02
After hour meter readings	Where access cannot be gained during normal working hours.	R82-83	R75-30	R73-82	R70-30	R66-95
	For audit purposes where consumers normally provide their own readings.	R82-83	R75-30	R73-82	R70-30	R66-95
Reconnection and disconnection	Current and new consumers	R147-22	R133-84	R131-22	R124-97	R119-02
	Tampering with meter: Cost (including cost of new meter) and Fine	R3 373-54 + R300 Fine	R3 066-85 + R300 Fine	R3 006-72 + R300 Fine	R2 863-54 + R300 Fine	R2 727-18 + R300 Fine
	Non Payment: Delivery of final notices in respect of outstanding accounts	R55-21	R50-19	R49-21	R46-87	R44-64
	Non Payment: Admission of guilt and arrangements for payment of accounts	R112-72	R102-47	R100-46	R95-68	R91-12
	Disconnection of services Office Hours	R147-22	R133-84	R131-22	R124-97	R119-02
	Reconnection of services Office Hours	R147-22	R133-84	R131-22	R124-97	R119-02
	Reconnection of services After Hours	R178-29	R162-08	R158-90	R151-33	R144-12
Repairs to a damaged water connection		R530-23	R482-03	R472-58	R450-08	R428-65
To re-position a water meter (within a radius of one metre)		R963-88	R876-25	R859-07	R818-16	R779-20
To adjust the height of a water meter		R423-28	R384-80	R377-25	R359-29	R342-18
Replace an existing water meter with a meter in a plastic box		Actual cost + 10%	R1 549-64	R1 519-25	R1 446-90	R1 378-00
Locating of water meter		R423-28	R384-80	R377-25	R359-29	R342-18
Replacement of an existing water meter with a flow control device		R2 946-81	R2 678-92	R2 626-39	R2 501-32	R2 382-21

Table C.3.1.1: Water tariffs for George and Wilderness for the last five financial years						
Consumer/Description (Tariff Code)	**Category**	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
Installation of a new 20 mm water connection with a flow control device		R4 831-99	R4 392-72	R4 306-59	R4 101-51	R3 906-20

Table C.3.1.2: Basic availability charge applicable to all vacant erven in George and Wilderness for the last five financial years						
Consumer/Description	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
Erven without improvements less than 10 000m² (2301)	R219-91 + R2-10 per 100m² or part thereof calculated on portion of the erf in excess of 1200m² to a max. of R404-80.	R199-92 + R1-91 per 100m² or part thereof calculated on portion of the erf in excess of 1200m² to a max. of R368-00.	R188-60 + R1-80 per 100m² or part thereof calculated on portion of the erf in excess of 1200m² to a max. of R527-00.	R177-92 + R1-70 per 100m² or part thereof calculated on portion of the erf in excess of 1 200m² to a max. of R497-52.	R167-85 + R1-60 per 100m² or part thereof calculated on portion of the erf in excess of 1 200m² to a max. of R468-65.
Housing Schemes (2306): Basic minimum charge per household per month	R112-07	R108-88	R96-11	R90-67	R85-54
Erven without improvements larger than 10 000m² (2304)	R219-91 + R2-10 per 100m² or part thereof calculated on portion of the erf in excess of 10 000m² to a max. of R430-01	R199-92 + R1-91 per 100m² or part thereof calculated on portion of the property that exceeds 10 000m² to a max. of R390-92	R188-60 + R1-80 per 100m² or part thereof calculated on portion of property that exceeds 5 000m² to a max. of R368-60.	R177-92 + R1-70 per 100m² or part thereof calculated on portion of property that exceeds 5 000m² to a max. of R347-92.	R167-85 + R1-60 per 100m² or part thereof calculated on portion of property that exceeds 5 000m² to a max. of R327-85.

Table C.3.1.3 Water Tariffs for Uniondale and Haarlem for the last five financial years							
Consumer/Description	**Category**	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
Block Tariff: Basic Tariff per meter per month, or where more than one consumer is served through the same meter, cost per consumer per month		R61-00	R57-20	R53-96	R50-91	R48-03
Domestic: Indigent Household Tariff Code – Haarlem: 1470 Uniondale: 1450	0 – 6 Kl	R0-00	R0-00	R0-00	R0-00	R0-00
	>6 – 12 Kl	R7-67	R7-78	R7-42	R7-00	R6-60
	>12 – 20 Kl	R10-22	R9-01	R8-50	R8-02	R7-57
	>20 – 30 Kl	R11-59	R10-83	R10-22	R9-64	R9-09
	>30 – 50 Kl	R14-48	R12-97	R12-24	R11-55	R10-90
	>50 Kl	-	R14-82	R13-98	R13-19	R12-44
	>50 – 100 Kl	R20-28	-	-	-	-
	>100 Kl	R34-59	-	-	-	-
Domestic Tariff Code – Haarlem: 1471 Uniondale: 1451	0 – 6 Kl	R0-00	R0-00	R0-00	R0-00	R0-00
	>6 – 12 Kl	R7-67	R7-78	R7-42	R7-00	R6-60
	>12 – 20 Kl	R10-22	R9-01	R8-50	R8-02	R7-57
	>20 – 30 Kl	R11-59	R10-83	R10-22	R9-64	R9-09
	>30 – 50 Kl	R14-48	R12-97	R12-24	R11-55	R10-90

Table C.3.1.3 Water Tariffs for Uniondale and Haarlem for the last five financial years						
Consumer/Description	**Category**	**22/23**	**21/22**	**20/21**	**19/20**	**18/19**
	>50 Kl	-	R14-82	R13-98	R13-19	R12-44
	>50 – 100 Kl	R20-28	-	-	-	-
	>100 Kl	R34-59	-	-	-	-
Industries / Businesses Tariff Code – Haarlem: 1472 Uniondale: 1452	0 – 6 Kl	R6-47	R7-87	R7-42	R7-00	R6-60
	>6 – 12 Kl	R7-67	R7-87	R7-42	R7-00	R6-60
	>12 – 20 Kl	R10-22	R9-01	R8-50	R8-02	R7-57
	>20 – 30 Kl	R11-59	R10-83	R10-22	R9-64	R9-09
	>30 – 50 Kl	R12-10	R11-86	R11-19	R10-56	R9-96
	>50 Kl	-	R13-01	R12-27	R11-58	R10-92
	>50 – 100 Kl	R13-12	-	-	-	-
	>100 Kl	R15-33	-	-	-	-
Churches Tariff Code – Haarlem: 1475 Uniondale: 1455	0 – 6 Kl	R7-50	R0-00	R0-00	R0-00	R0-00
	>6 – 12 Kl	R7-67	R7-78	R7-42	R7-00	R6-60
	>12 – 20 Kl	R7-84	R9-01	R8-50	R8-02	R7-57
	>20 – 30 Kl	R7-84	R10-83	R10-22	R9-64	R9-09
	>30 – 50 Kl	R8-01	R12-97	R12-24	R11-55	R10-90
	>50 Kl	-	R14-82	R13-98	R13-19	R12-44
	>50 – 100 Kl	R8-35	-	-	-	-
	>100 Kl	R9-20	-	-	-	-
Schools Tariff Code – Haarlem: 1474 Uniondale: 1454	0 – 6 Kl	R7-50	R7-87	R7-42	R7-00	R6-60
	>6 – 12 Kl	R7-67	R7-87	R7-42	R7-00	R6-60
	>12 – 20 Kl	R7-84	R9-01	R8-50	R8-02	R7-57
	>20 – 30 Kl	R7-84	R10-83	R10-22	R9-64	R9-09
	>30 – 50 Kl	R8-01	R11-86	R11-19	R10-56	R9-96
	>50 Kl	-	R13-01	R12-27	R11-58	R10-92
	>50 – 100 Kl	R8-35	-	-	-	-
	>100 Kl	R9-20	-	-	-	-
Irrigation Water	Haarlem Agriculture	R73-20 per erf / month	R57-20 per erf / month	R53-96 per erf / month	R50-91 per erf / month	R48-03 per erf / month
Basic Availability Charge applicable to all vacant erven Tariff Code 2303		R52-36 per erf / month	R47-60 per erf / month	R44-91 per erf / month	R42-37 per erf / month	R39-97 per erf / month

The sewerage tariff structures for George Municipality for the 2022/2023 financial year and the previous four financial years are summarised in the table below (Subject to VAT).

Table C.3.1.4: Sewerage Tariffs for George Municipality for the last five financial years

Consumer/Description (Tariff Code)	Category	22/23 (Per month)	21/22 (Per month)	20/21 (Per month)	19/20 (Per Month)	18/19 (Per Month)
Basic Charges: Uniondale / Haarlem (2625)	Properties connected to the sewerage system	R101-93	R93-51	R88-22	R82-84	R76-35
Basic Charges George: All vacant erven (2601)	1 – 1 200 m²	R242-31	R222-30	R209-72	R196-92	R181-49
	1 201 – 3 400 m²	R242-31 + R3-51 per 100m² or part thereof	R222-30 + R3-22 per 100m² or part thereof	R209-72 + R3-04 per 100m² or part thereof	R196-92 + R2-85 per 100m² or part thereof	R181-49 + R2-63 per 100m² or part thereof
	3 401 – 10 000 m²	R319-52 + R1-74 per 100m² or part thereof	R293-14 + R1-60 per 100m² or part thereof	R276-60 + R1-51 per 100m² or part thereof	R259-62 + R1-42 per 100m² or part thereof	R239-35 + R1-31 per 100m² or part thereof
	10 001 – 20 000 m²	R434-63 + R0-89 per 100m² or part thereof	R398-74 + R0-82 per 100m² or part thereof	R376-26 + R0-77 per 100m² or part thereof	R353-34 + R0-72 per 100m² or part thereof	R325-81 + R0-66 per 100m² or part thereof
	Over 20 000 m²	R524-01	R480-74	R453-26	R425-34	R391-81
Properties connected to the sewerage system: Single residential properties, duet houses, group housing, sectional scheme units, farms, small holdings and Garden Route Botanical Garden (2602)	All erven zoned for single residential purposes with improvements (2602).	R271-88	R249-43	R235-31	R220-95	R203-64
	For every additional residence or residential unit erected on an erf zoned for single residential purposes (2608)	R271-88	R249-43	R235-31	R220-95	R203-64
Properties connected to the sewerage system: Erven larger than 10 000m² (2606)		R242-31 + R0-89 / 100m² or part thereof calculated on portion of property >10 000m² with a max. R331-69.	R222-30 + R0-82 / 100m² or part thereof calculated on portion of property >10 000m² with a max. R304-30.	R209-72 + R0-77 / 100m² or part thereof calculated on portion of property >5 000m² with a max. R286-72.	R196-92 + R0-72 / 100m² or part thereof calculated on portion of property >5 000m² with a max. R268-92.	R181-49 + R0-66 / 100m² or part thereof calculated on portion of property >5 000m² with a max. R247-49.
Properties connected to the sewerage system	Houses in assisted housing schemes, Kleinkrantz Touwsranten and Rosemoor Cottage (2605, 2618, 2619)	-	-	-	-	R203-64
Blocks of flats (2603)	Per flat or residential unit	R271-88	R249-43	R235-31	R220-95	R203-64
Churches (2609)	For each cloakroom with a max. of two cloakrooms	R295-00	R270-64	R255-32	R239-74	R220-96
Sectional Scheme Units (Businesses) (2611)	For each water closet system or urinal	R295-00	R270-64	R255-32	R239-74	R220-96
Tourist camps and show organisations (2614)	For each water closet system or urinal	R98-32	R90-21	R85-10	R79-91	R73-65

Table C.3.1.4: Sewerage Tariffs for George Municipality for the last five financial years							
Consumer/Description (Tariff Code)	**Category**		**22/23 (Per month)**	**21/22 (Per month)**	**20/21 (Per month)**	**19/20 (Per Month)**	**18/19 (Per Month)**
Institutions for disabled persons (2604)	For each water closet system or room with a urinal		R295-00	R270-64	R255-32	R239-74	R220-96
Schools / School Hostels – Total charge (Including Basic): Less 60% discount (2613)	For each water closet system or urinal		R295-00	R270-64	R255-32	R239-74	R220-96
Sport bodies (2604)	For each water closet system or room with a urinal		R295-00	R270-64	R255-32	R239-74	R220-96
Municipal Crèches	Per Crèche per month		R271-88	R249-43	R235-31	R220-95	R203-64
Garden Route Botanical Garden (2627)	Per month		-	-	-	-	R203-64
Municipal Sport bodies (2623)	Per month		R543-77	R498-87	R470-63	R441-91	R407-29
Commercial and Industrial properties (2604)	For each water closet system or room with a urinal		R295-00	R270-64	R255-32	R239-74	R220-96
Guest houses and bed-and-breakfasts concerns and hotels (2610, 2624)	For each water closet system or room with a urinal		-	R270-64	R255-32	R239-74	R220-96
	3 Bedrooms or less		-	R249-43 + 25% of the tariff	R235-31 + 25% of the tariff	R220-95 + 25% of the tariff	R203-64 + 25% of the tariff
	4 Bedrooms or more, for each water closet system or urinal		-	R270-64	R255-32	R239-74	R220-96
	5 Bedrooms or more, for each water closet system or urinal		R295-00	-	-	-	-
	1 – 4 Rooms >20Kl per month = 1.0 x Kl consumption charge for business tariff (code: 1 405) of water usage	Basic Charge per month	R271-88	-	-	-	-
		>20 - 30 Kl per Kl	R27-50	-	-	-	-
		>30 - 50 Kl per Kl	R29-50	-	-	-	-
		>50 - 100 Kl per Kl	R32-25	-	-	-	-
		>100 Kl per Kl	R32-25	-	-	-	-
Body Corporates (Businesses) (2622)	Basic Charge per month		R240-06	R220-24	R207-77	R195-09	R179-81
George: Sewerage Removal: Storage tank	Basic Charge per month		R154-50	-	-	-	-
	Storage tank per 7 000 litres or part thereof		R736-46	R675-65	R662-61	R630-87	R600-87
	Storage tank per 7 000 litres or part thereof (After hours)		R1 472-92	R1 351-30	R1 325-22	R1 261-74	R1 201-74
George: Sewerage Removal: Septic tank per load			R2 240-66	R2 055-65	R2 015-22	R1 919-13	R1 827-83
George: Sewerage Removal: Septic tank: After hours per load			R4 481-32	R4 111-30	R4 030-44	R3 838-26	R3 655-66
Private delivery at WWTW – Storage Tank Waste per Kl			R5-78	R5-30	R5-20	R4-95	R4-71

Table C.3.1.4: Sewerage Tariffs for George Municipality for the last five financial years						
Consumer/Description (Tariff Code)	**Category**	**22/23 (Per month)**	**21/22 (Per month)**	**20/21 (Per month)**	**19/20 (Per Month)**	**18/19 (Per Month)**
Private delivery at WWTW – Septic Tank Waste per Kl		R229-97	R210-98	R206-84	R196-99	R187-61
Private delivery at WWTW – Chemical Toilet Waste per Kl		R288-45	R264-63	R259-44	R247-09	R235-32
Sewerage Removal (Suction Tank Services) Uniondale / Haarlem (2630)	Basic: First suction per erf per month	R154-50	R141-74	R138-70	R132-17	R126-09
	Extra suction (Per suction)	R299-51	R274-78	R269-57	R256-52	R244-35
	Extra suction After Hours (Per suction)	R599-02	R549-56	R539-14	R513-04	R488-70
	Rural Area DMA Area (Per suction)	R736-46	R675-65	R457-39	R435-65	R414-78
	Rural Area DMA Area After Hours (Per suction)	R1 472-92	R1 351-30	R914-78	R871-30	R829-56
	Avontuur "Agri" Basic per unit per month	R154-50	R141-74	R138-70	R132-17	R126-09
	Avontuur "Agri" Cost per suction	R299-51	R274-78	R269-57	R256-52	R244-35
	Avontuur "Agri" Cost per suction After Hours	R559-02	R549-56	R539-14	R513-04	R488-70
Industrial Effluent Charges: The charge for industrial effluent per kiloliter for the disposal of effluent that does not comply with residential effluent standards and may include effluent discharged into a stormwater system shall be determined in accordance with the following formula; Formula: Tc = X + Y(CODi / CODw) + Z + Penalty Where Tc is the extraordinary treatment cost to the consumer per kl and X the conveyance cost per kl. Y is the variable treatment costs per kl and Z is the fixed costs per kl. CODi is the average of each industry, inclusive of both biodegradable and non-biodegradable portion of COD, while CODw is the average of works (weighted for more than one works), inclusive of both biodegradable and non-biodegradable portion of COD. Penalty per kl charged in addition to the effluent charge based on volume and COD, for prohibited effluents, for instances where CODi of the effluent exceeds 3000 mg/L or where any other quality parameter exceeds the maximum value allowed according to Annexure A of the by-laws, as contained in the permit for the industry. The following tariffs apply: X = R3-83/kl Y = R1-61/kl Z = R1-56/kl						
Sewerage connection		Actual cost + 10%	Actual cost + 10%	Actual cost + 10%	Actual cost + 10%	Actual cost + 10%
Sewerage connection, replacement of bucket system (Qualifies for the equitable fund). The cost that will be recovered from the equitable fund		R2 814-03	R2 581-68	R2 531-06	R2 410-53	R2 295-74
Sewerage connection, replacement of bucket system (Where a consumer does not qualify for the equitable fund).		R2 814-03	R2 581-68	R2 531-06	R2 410-53	R2 295-74

C.3.2. Metering, Billing and Free Basic Services

The table below gives an overview of the metering, billing and free basic services of George Municipality.

Table C.3.2.1: Overview of Metering, Billing and Free Basic Services

Regulations Ref. #	Description	Unit	Year 0	Year - 1	Year - 2
			FY2022/23	FY2021/22	FY2020/21
	UNITS SUPPLIED (as per water services access profile)				
10.2 (b) (i)	Household water connections (house and yard connections)	Nr	**61 921**	**60 996**	**58 497**
10.2 (b) (iv)	Household sewerage connections	Nr	**60 789**	**59 864**	**57 365**
	METERING				
	Metered Water Connections (aligned with Table C2.1)				
	Residential	Nr	45 646	43 198	42 422
	Commercial / Business	Nr	2 296	2 170	2 061
	Industrial	Nr	13	13	13
	Government / Institutional	Nr	152	152	152
	Other	Nr	158	152	149
	Sub-Total: Metered Water Connections	**Nr**	**48 265**	**45 685**	**44 797**
	Proportion of metered connections (residential) *	%	74%	71%	73%
	Total number of meters	Nr	**48 265**	**45 685**	**44 797**
10.2 (b) (vi)	Total number of new connections (aligned with Table C.2.1)	Nr	2 580	888	728
10.2 (e) (i)	Total number of new meters installed	Nr	434	485	496
	Proportion of new connections, metered	%	100%	100%	100%
	Number of meters tested	Nr	0	0	0
10.2 (e) (ii)	Proportion of meters tested to total number of meters	%	0%	0%	0%
	Number of meters replaced	Nr	1 805	1 486	1 165
10.2 (e) (ii)	Proportion of meters replaced to total number of meters	%	4%	3%	3%
	BILLING				
	Customer billing (water and sewerage)		**Nr**	**Nr**	**Nr**
	Residential	Nr	45 646	43 198	42 422
	Commercial / Business	Nr	2 296	2 170	2 061
	Industrial	Nr	13	13	13
	Government / Institutional	Nr	152	152	152
	Other	Nr	158	152	149
	Sub-Total: Customers billed	Nr	**48 265**	**45 685**	**44 797**
	Proportion of bills to metered connections	%	**100%**	**100%**	**100%**
	Residential	%	100%	100%	100%
	Commercial / Business	%	100%	100%	100%
	Industrial	%	100%	100%	100%
	Government / Institutional	%	100%	100%	100%
	etc.	%	100%	100%	100%
	FREE BASIC SERVICES				
	Nr customers receiving:				
	Free Basic Water	Nr	10 488	13 856	14 324
10.2 (b) (v)	Free Basic Sanitation	Nr	10 228	13 499	13 906
	Proportion of Free Basic Services				
	Water	%	23.0%	32.1%	33.8%
	Sewerage	%	22.4%	31.2%	32.8%

Note: * All residential consumers in the urban areas of George Municipality's Management Area are metered. The "Water Services Access Profile" however includes the consumers on the farms and the backyard dwellers on formal erven in the urban areas. Backyard dwellers use the service of the main house, which is metered. Consumers on the farms utilise their own water sources, which is not metered by the Municipality, therfore the 71% - 74% compliance in the above table.

The graph below gives an overview of the number of new water connections installed per financial year for the different connection sizes. 434 New water connections were provided during the 2022/2023 financial year.

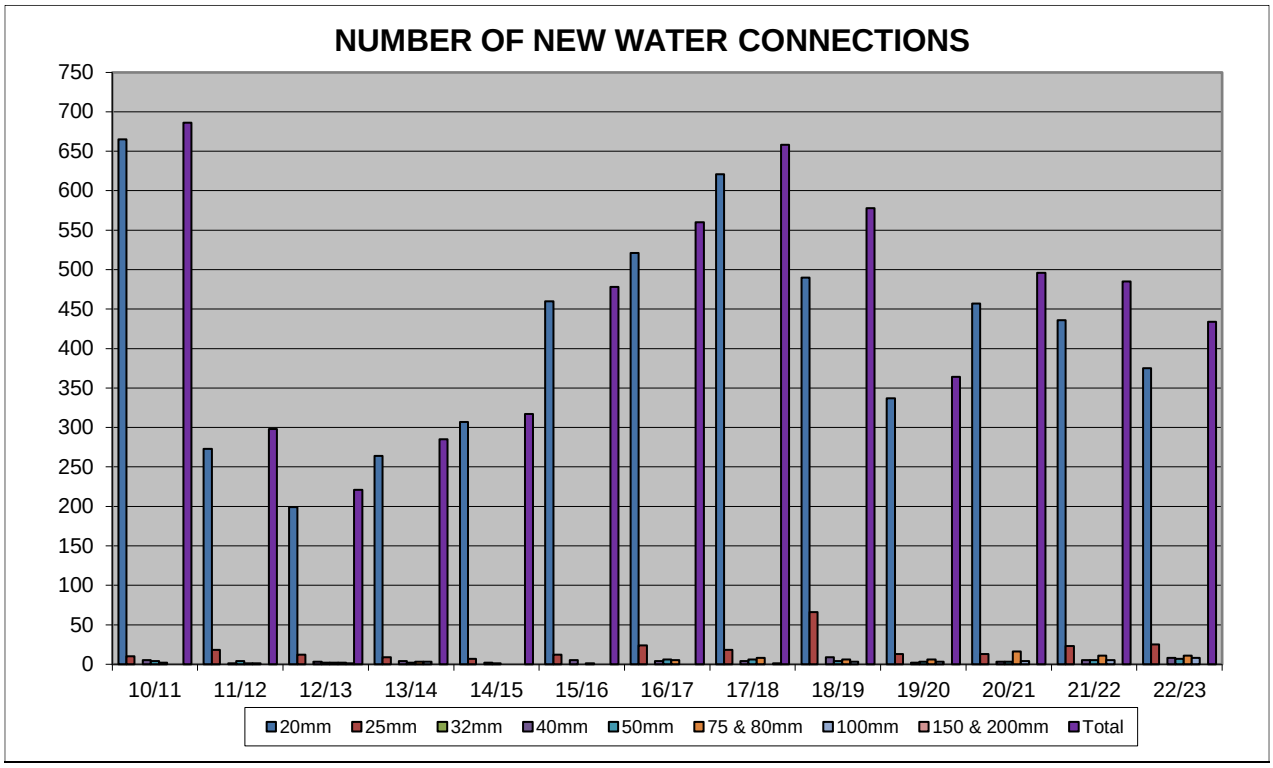


Figure C.3.2.1: Number of new water connections per financial year for the different connection sizes.

The graph below gives an overview of the number of water meters replaced, relocated, tested, removed and other repairs for the various financial years (2021/2022 Financial year data was estimated from six months records).

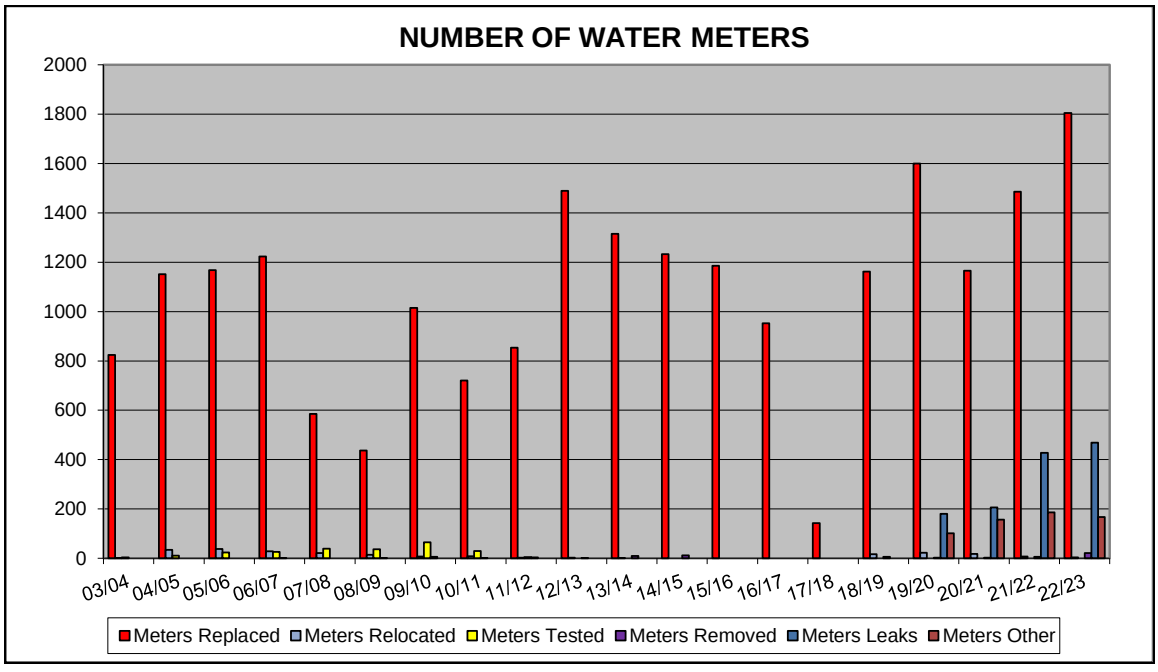


Figure C.3.2.2: Number of water meters replaced, relocated, tested, removed, leaks repaired and other repairs per financial year.

C.3.3. Revenue Collection and Cost Recovery

The table and figures below give an overview of George Municipality's water services revenue collection and cost recovery.

Table C.3.3.1: Overview of Water Services Revenue Collection and Cost Recovery				
Regulations Ref. #	Description	Year 0	Year - 1	Year - 2
		FY2022/23	FY2021/22	FY2020/21
	INCOME	**R'000**	**R'000**	**R'000**
	Billed			
	Water reticulation / provision	R 455 664	R 252 404	R 152 888
	Sewerage / wastewater	R 213 191	R 158 169	R 143 153
	Sub-Total: Billed	**R 668 855**	**R 410 573**	**R 296 041**
	Collections			
	Water reticulation / provision	R 461 425	R 281 137	R 180 569
	Sewerage / wastewater	R 247 815	R 197 973	R 182 633
	Sub-Total: Collections	**R 709 240**	**R 479 110**	**R 363 202**
	Equitable share income			
	Water reticulation / provision	R 47 856	R 38 357	R 39 145
	Sewerage / wastewater	R 57 231	R 46 581	R 51 075
	Sub-Total: Equitable share income	**R 105 087**	**R 84 938**	**R 90 221**
	EXPENDITURE (O&M)	**R'000**	**R'000**	**R'000**
	Water services	R 248 060	R 199 543	R 180 101
	Sewerage / wastewater services	R 194 659	R 155 025	R 146 669
	Total: Water Services O&M	**R 442 719**	**R 354 569**	**R 326 770**
	COST RECOVERY ANALYSIS / RATIO'S	**%**	**%**	**%**
10.2 (d) (ii)	**Billed as % of Cost**			
	Water	203%	146%	107%
	Sewerage	139%	132%	132%
	Total	**175%**	**140%**	**118%**
10.2 (d) (iii)	**Unrecovered as % of Cost**			
	Water services	17%	5%	6%
	Sewerage / wastewater services	12%	4%	8%
	Total	**15%**	**5%**	**7%**

The figure below gives an overview of the revenue collection and cost recovery profile for water services for George Municipality.

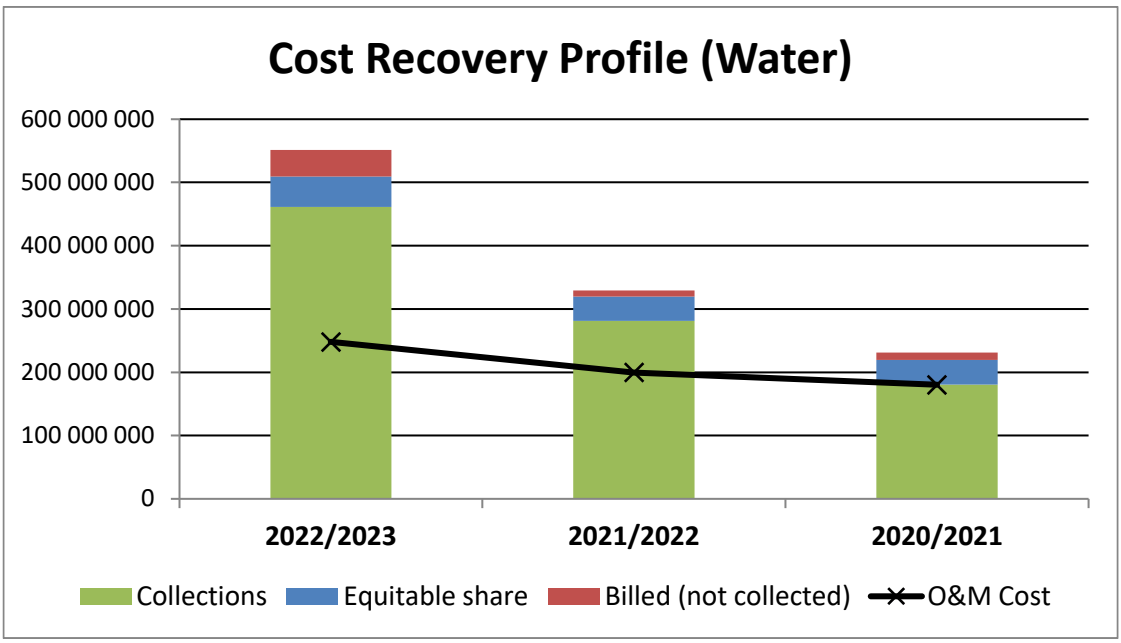


Figure C.3.3.1: Revenue collection and cost recovery profile (Water)

The figure below gives an overview of the revenue collection and cost recovery profile for wastewater services for George Municipality.

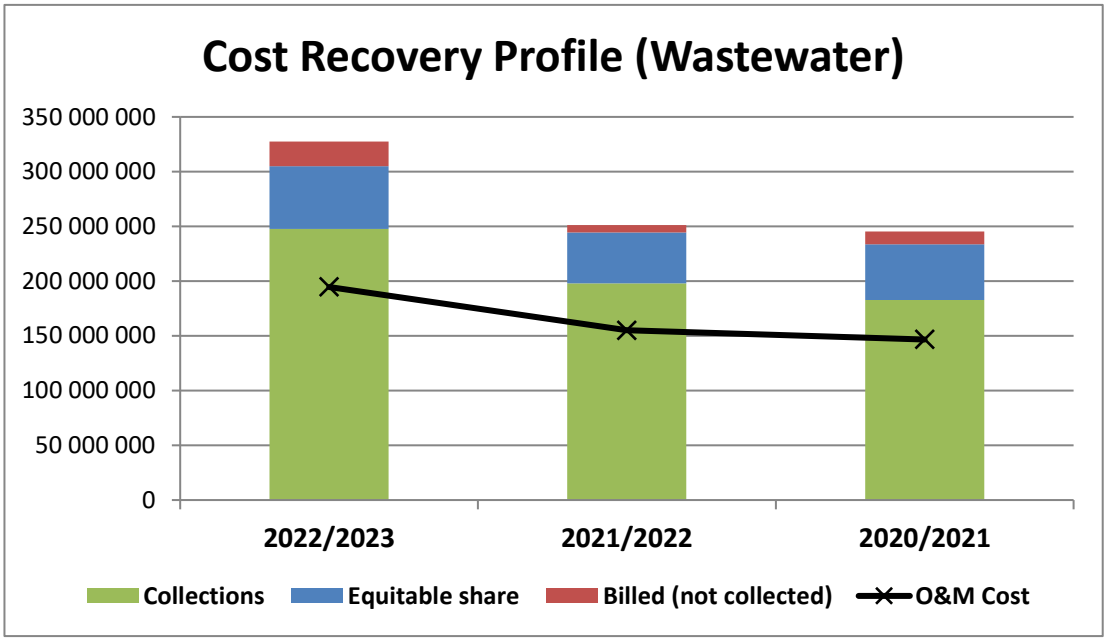


Figure C.3.3.2: Revenue collection and cost recovery profile (Wastewater)

George Municipality's Operational and Maintenance Budgets for water and sewerage services for the last five financial years are summarised in the table below (Unaudited figures).

Table C3.3.2: Summary of operational and maintenance budget for water and sewerage services for the last five financial years					
Expenditure / Income	**Actual 22/23**	**Actual 21/22**	**Actual 20/21**	**Actual 19/20**	**Actual 18/19**
Water Services (Water Purification – 835, Water Distribution – 848 and Filtration Plant 836)					
Expenditure Water Purification	R123 274 621-60	R88 409 129-58	R78 689 667-26	R69 743 504-79	R59 454 661-17
Expenditure Water Distribution	R124 785 244-64	R111 134 239-59	R101 411 557-72	R97 827 401-16	R78 504 736-70
Expenditure Filtration Plant	R0-00	R0-00	R0-00	R487 469-78	R379 338-07
Nett Expenditure	R248 059 866-24	R199 543 369-17	R180 101 224-98	R168 058 375-73	R138 338 735-94
Income Water Purification	(R213 221 807-73)	(R67 701 395-15)	(R568 790-00)	(R9 462 527-77)	(R5 469 775-82)
Income Water Distribution	(R290 297 659-03)	(R223 060 127-68)	(R191 464 478-13)	(R175 286 921-85)	(R178 802 846-66)
Income Filtration Plant	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
Income	(R503 519 466-76)	(R290 761 522-83	(R192 033 268-13)	(R184 749 449-62)	(R184 272 622-48)
(Surplus) / Deficit before Appropriations	**(R255 459 600-52)**	**(R91 218 153-66)**	**(R11 932 043-15)**	**(R16 691 073-89**	**(R45 933 886-54)**
Appropriations	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
(Surplus) / Deficit after Appropriations	**(R255 459 600-52)**	**(R91 218 153-66)**	**(R11 932 043-15)**	**(R16 691 073-89**	**(R45 933 886-54)**
Sewerage Services (Sewerage Mainlines and Pump Stations – 521, Water Contamination Control – 563, Laboratory Services - 564)					
Expenditure Sewerage Mainlines & PS	R132 961 573-66	R104 574 075-40	R98 855 036-03	R93 809 153-12	R84 004 041-64
Expenditure Water Contamination Control	R55 538 727-43	R46 229 056-51	R44 242 097-51	R39 747 831-80	R36 118 666-75
Expenditure Laboratory Services	R6 159 105-66	R4 222 352-88	R3 571 789-10	R2 950 393-71	R2 875 925-85
Nett Expenditure	R194 659 406-75	R155 025 484-79	R146 668 922-64	R136 507 378-63	R122 998 634-24
Income Sewerage Mainlines & PS	(R270 417 578-77)	(R204 565 370-80)	(R181 129 742-85)	(R156 901 789-26)	(R128 228 546-98)
Income Water Contamination Control	(R0-00)	(R181 231-00)	(R13 094 441-85)	(R2 260 179-64)	(R35 309 908-20)
Income Laboratory Services	(R4 220-20)	(R3 237-48)	(R4 205-17)	(R18 180-97)	(R92 220-44)
Income	(R270 421 798-97)	(R204 749 839-28)	(R194 228 389-87)	(R159 180 149.87	(R163 630 675-62)
(Surplus) / Deficit before Appropriations	**(R75 762 392-22)**	**(R49 724 354-49)**	**(R47 559 467-23)**	**(R22 672 771-24)**	**(R40 632 041-38)**
Appropriations	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
(Surplus) / Deficit after Appropriations	**(R75 762 392-22)**	**(R49 724 354-49)**	**(R47 559 467-23)**	**(R22 672 771-24)**	**(R40 632 041-38)**
(Surplus) / Deficit for Water and Sewerage Services before Appropriations	**(R331 221 992-74)**	**(R140 942 508-15)**	**(R59 491 510-38)**	**(R39 363 845-13)**	**(R86 565 927-92)**
(Surplus) / Deficit for Water and Sewerage Services after Appropriations	**(R331 221 992-74)**	**(R140 942 508-15)**	**(R59 491 510-38)**	**(R39 363 845-13)**	**(R86 565 927-92)**

George Municipality's detail Operational and Maintenance Expenditure Budgets for Water Purification, Water Distribution and Filtration Plant services for the last five financial years are summarised in the table below (Unaudited figures).

Table C 3.3.3: Detail operational and maintenance expenditure budget for Water Purification, Water Distribution and Filtration Plant services for the last five financial years.					
Description	**Actual 22/23**	**Actual 21/22**	**Actual 20/21**	**Actual 19/20**	**Actual 18/19**
WATER PURIFICATION (835)					
Bulk Purchases	R14 874 818-88	R14 995 783-77	R14 995 784-47	R14 767 213-75	R3 179 477-05
Contracted Services	R11 959 181-11	R6 564 474-02	R4 553 399-68	R3 141 921-71	R3 359 569-13
Default	R25 239 769-31	R22 837 705-46	R18 914 225-91	R18 248 937-05	R14 138 920-62
Depreciation and Amortisation	R673 142-65	R424 891-65	R357 297-04	R610 616-90	R9 564 623-24
Employee Related Cost	R19 728 439-17	R16 021 204-60	R13 782 167-96	R13 856 483-95	R11 936 363-49
Interest, Dividends and Rent	R2 467 811-46	R2 702 588-76	R3 308 084-42	R3 143 705-60	R3 334 761-66
Gains and Losses	(R3 772-51)	R0-00	R0-00	R0-00	R0-00
Inventory Consumed	R47 755 199-21	R24 206 606-82	R22 139 546-30	R15 338 808-01	R13 322 993-07
Operating Leases	R34 327-58	R44 883-24	R44 883-24	R29 079-97	R18 690-31
Operational Cost	R545 704-74	R610 991-26	R594 278-24	R606 737-85	R599 262-60
Nett Expenditure	**R123 274 621-60**	**R88 409 129-58**	**R78 689 667-26**	**R69 743 504-79**	**R59 454 661-17**
WATER DISTRIBUTION (848)					
Bad Debt Written Off	R16 474 868-59	R21 543 869-77	R15 107 913-19	R8 182 366-11	R7 344 234-64
Bulk Purchases	R13 105 755-14	R12 496 280-41	R14 976 767-96	R15 017 400-43	R14 162 740-62
Contracted Services	R24 163 346-85	R15 501 242-60	R5 534 330-58	R4 511 625-83	R6 308 571-60
Default	R257 461-76	R13 230 561-03	R13 639 709-10	R15 289 791-79	R13 358 552-26
Depreciation & Amortisation	R874 983-94	R636 138-12	R624 656-28	R579 167-84	R1 200 873-32
Employee Related Cost	R28 836 051-46	R24 598 258-07	R23 650 654-38	R22 352 160-84	R21 284 121-53
Interest Dividend Rent on Land	R3 054 072-93	R3 276 454-80	R3 644 393-84	R3 977 146-12	R4 211 361-37
Gains and Losses	R23 209 253-64	R9 076 908-53	R15 059 805-36	R16 547 098-15	R4 979 676-78
Inventory Consumed	R8 176 358-63	R3 228 713-48	R3 099 857-91	R5 415 379-62	R1 138 031-35
Operational Leases	R5 985-44	R0-00	R0-00	R0-00	R0-00
Operational Cost	R6 627 106-26	R7 545 812-78	R6 073 469-12	R5 955 264-43	R4 516 573-23
Nett Expenditure	**R124 785 244-64**	**R111 134 239-59**	**R101 411 557-72**	**R97 827 401-16**	**R78 504 736-70**
FILTRATION PLANT (836)					
Contracted Services	R0-00	R0-00	R0-00	R487 469-78	R379 338-07
Default	R0-00	R0-00	R0-00	R0-00	R0-00
Nett Expenditure	**R0-00**	**R0-00**	**R0-00**	**R487 469-78**	**R379 338-07**

George Municipality's detail Operational and Maintenance Expenditure Budgets for Sewerage, Water Contamination Control and Laboratory services for the last five financial years are summarised in the table below (Unaudited figures).

Table C.3.3.4: Detail operational and maintenance expenditure budget for Sewerage, Water Contamination Control and Laboratory services for the last five financial years					
Description	**Actual 22/23**	**Actual 21/22**	**Actual 20/21**	**Actual 19/20**	**Actual 18/19**
SEWERAGE MAINLINES AND PUMP STATIONS (521)					
Bad Debts Written Off	R4 495 327-34	R3 952 420-57	R1 729 255-56	R2 498 077-44	R3 250 671-06
Bulk Purchases	R13 353 681-05	R14 235 730-66	R14 035 320-84	R14 475 195-37	R13 537 775-47
Contracted Services	R29 376 388-34	R16 445 724-54	R13 719 641-15	R9 804 312-07	R13 112 938-62
Default	R17 365 299-02	R23 046 050-73	R23 294 749-08	R25 968 414-15	R26 039 985-12
Depreciation and Amortisation	R5 629 534-48	R2 108 853-85	R1 990 550-29	R1 901 704-80	R1 517 764-82
Employee Related Cost	R25 411 254-17	R22 491 872-29	R22 209 165-29	R21 244 222-15	R18 697 247-57
Gains and Losses	R16 460 675-95	R6 059 790-64	R10 398 679-47	R4 459 036-43	(R1 057 941-28)
Interest, Dividends and Rent	R3 538 066-78	R3 026 263-88	R3 225 368-03	R3 466 778-53	R3 749 311-44
Inventory Consumed	R12 964 614-22	R6 835 230-54	R4 734 619-84	R6 260 052-75	R1 852 897-14
Operational Cost	R4 366 732-31	R6 372 137-70	R3 517 686-48	R3 731 359-43	R3 303 391-68
Nett Expenditure	**R132 961 573-66**	**R104 574 075-40**	**R98 855 036-03**	**R93 809 153-12**	**R84 004 041-64**
WATER CONTAMINATION CONTROL (563)					
Bulk Purchases	R5 050 011-36	R5 101 498-06	R4 445 557-02	R4 077 604-80	R3 862 038-79
Contracted Services	R9 211 880-26	R7 169 670-06	R6 981 300-95	R5 102 939-05	R5 554 757-43
Default	R11 898 414-44	R13 030 668-84	R11 657 358-72	R9 746 276-05	R8 690 248-35
Depreciation and Amortisation	R1 925 523-15	R830 570-75	R748 765-06	R814 732-85	R727 174-82
Employee Related Cost	R17 494 566-02	R16 825 618-39	R16 400 209-51	R15 244 471-69	R14 668 011-67
Gains and Losses	(R151 876-40)	(R6 463-31)	R0-00	R0-00	R0-00
Interest, Dividends and Rent	R6 831 842-55	R1 158 309-83	R744 958-08	R701 413-44	R469 647-82
Inventory Consumed	R1 755 051-62	R1 517 553-69	R2 419 999-65	R3 078 462-47	R1 162 470-71
Operating Leases	R33 856-22	R41 583-42	R42 802-20	R40 134-03	R40 048-18
Operational Cost	R1 489 458-21	R560 046-78	R801 146-32	R941 797-42	R944 268-98
Nett Expenditure	**R55 538 727-43**	**R46 229 056-51**	**R44 242 097-51**	**R39 747 831-80**	**R36 118 666-75**
Laboratory Services (564)					
Contracted Services	R1 483 988-40	R1 210 501-73	R649 330-65	R47 503-20	R261 130-21
Default	R2 090-00	R0-00	R1 700-00	R1 590-00	R119 230-00
Employee Related Cost	R3 229 200-56	R2 367 147-26	R2 201 576-06	R2 065 909-36	R1 706 845-24
Inventory Consumed	R1 342 644-87	R560 198-83	R624 185-03	R628 604-89	R698 699-73
Operating Leases	R2 183-87	R0-00	R0-00	R0-00	R1 604-94
Operational Cost	R98 997-96	R84 505-06	R94 997-36	R206 786-26	R88 415-73
Nett Expenditure	**R6 159 105-66**	**R4 222 352-88**	**R3 571 789-10**	**R2 950 393-71**	**R2 875 925-85**

George Municipality's Operational and Maintenance Income Budgets for Water and Sewerage services for the last five financial years are summarised in the table below (Unaudited figures).

Table C.3.3.5: Operational income budget for water and sewerage services for the last five financial years					
Description	**Actual 22/23**	**Actual 21/22**	**Actual 20/21**	**Actual 19/20**	**Actual 18/19**
Water Purification (835)	(R213 221 807-73)	(R67 701 395-15)	(R568 790-00)	(R9 462 527-77)	(R5 469 775-82)
Water Distribution (848)	(R290 297 659-03)	(R223 060 127-68)	(R191 464 478-13)	(R175 286 921-85)	(R178 802 846-66)
Filtration Plant (836)	(R0-00)	(R0-00)	(R0-00)	(R0-00)	(R0-00)
Nett Income Water	**(R503 519 466-76)**	**(R290 761 522-83**	**(R192 033 268-13)**	**(R184 749 449-62)**	**(R184 272 622-48)**
Sewerage Mainlines and PS (521)	(R270 417 578-77)	(R204 565 370-80)	(R181 129 742-85)	(R156 901 789-26)	(R128 228 546-98)
Water Contamination Control (563)	(R0-00)	(R181 231-00)	(R13 094 441-85)	(R2 260 179-64)	(R35 309 908-20)
Laboratory Services (564)	(R4 220-20)	(R3 237-48)	(R4 205-17)	(R18 180-97)	(R92 220-44)
Nett Income Sanitation	**(R270 421 798-97)**	**(R204 749 839-28)**	**(R194 228 389-87)**	**(R159 180 149.87**	**(R163 630 675-62)**

The tables below give an overview of the analysis of the consumer debtors' age in days for water and sewerage services for the 2022/2023 financial year as on the 30th of June 2023, as well as the previous four financial years (Unaudited figures).

Table C.3.3.6 Analysis of Consumer Debtors age in days as at 30 June for water services for the last five financial years					
Age in days	**2022/2023**	**2021/2022**	**2020/2021**	**2019/2020**	**2018/2019**
Current (0 – 30 days)	R32 999 603	R26 248 845	R23 437 851	R22 425 978	R20 969 096
31 – 60 days	R9 139 812	R6 255 557	R5 754 622	R5 147 127	R3 967 463
61 – 90 days	R7 731 023	R5 776 738	R4 941 499	R3 784 375	R3 141 752
91 – 120 days	R7 339 392	R4 533 353	R4 431 907	R3 726 404	R2 904 045
>121 days	R142 268 097	R117 256 125	R105 151 568	R91 403 057	R76 308 016
Sub Total	**R199 477 927**	**R160 070 618**	**R105 151 568**	**R126 486 941**	**R107 290 372**
Less: Impairment	(R154 519 060)	(R127 844 665)	(R117 778 529)	(R104 315 849)	(R85 210 770)
Total	**R44 958 867**	**R32 225 953**	**R25 938 918**	**R22 171 092**	**R22 079 602**

Table C.3.3.7: Analysis of Consumer Debtors age in days as at 30 June for sewerage services for the last five financial years					
Age in days	**2022/2023**	**2021/2022**	**2020/2021**	**2019/2020**	**2018/2019**
Current (0 – 30 days)	R11 813 259	R9 049 059	R9 489 386	R10 152 069	R10 119 385
31 – 60 days	R4 035 742	R2 787 673	R2 853 960	R3 021 477	R1 593 300
61 – 90 days	R3 293 101	R2 118 685	R2 190 451	R2 090 166	R1 034 108
91 – 120 days	R2 894 268	R1 780 688	R1 841 067	R1 599 497	R762 905
>121 days	R55 446 341	R39 085 481	R30 031 114	R17 976 476	R15 298 309
Sub Total	**R77 482 711**	**R54 821 586**	**R46 405 978**	**R34 839 685**	**R28 808 007**
Less: Impairment	(R59 684 575)	(R40 852 371)	(R34 046 826)	(R23 447 995)	(R18 338 308)
Total	**R17 798 136**	**R13 969 215**	**R12 359 152**	**R11 391 690**	**R10 469 699**

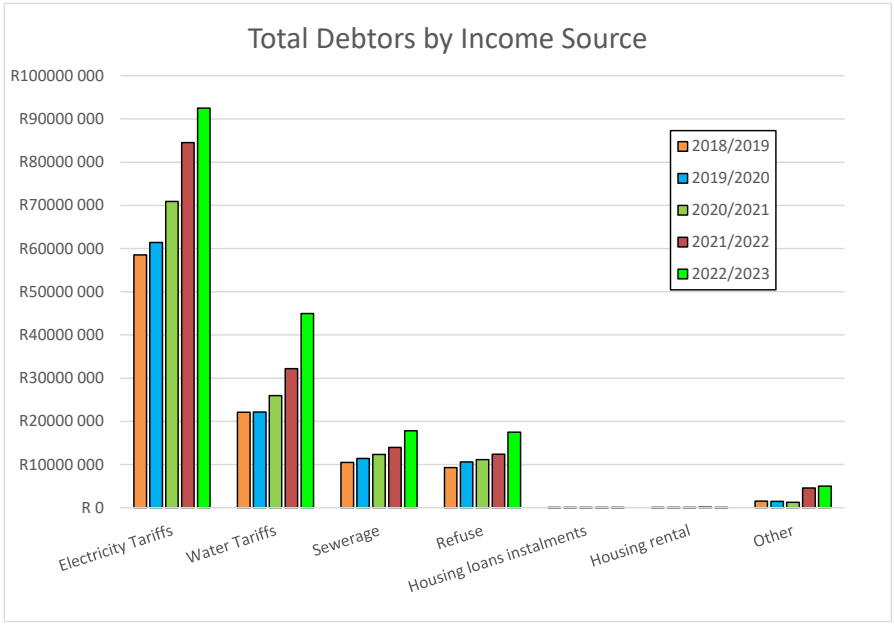


Figure C.3.3.3: Total Debtors by Income Source for the last five financial years

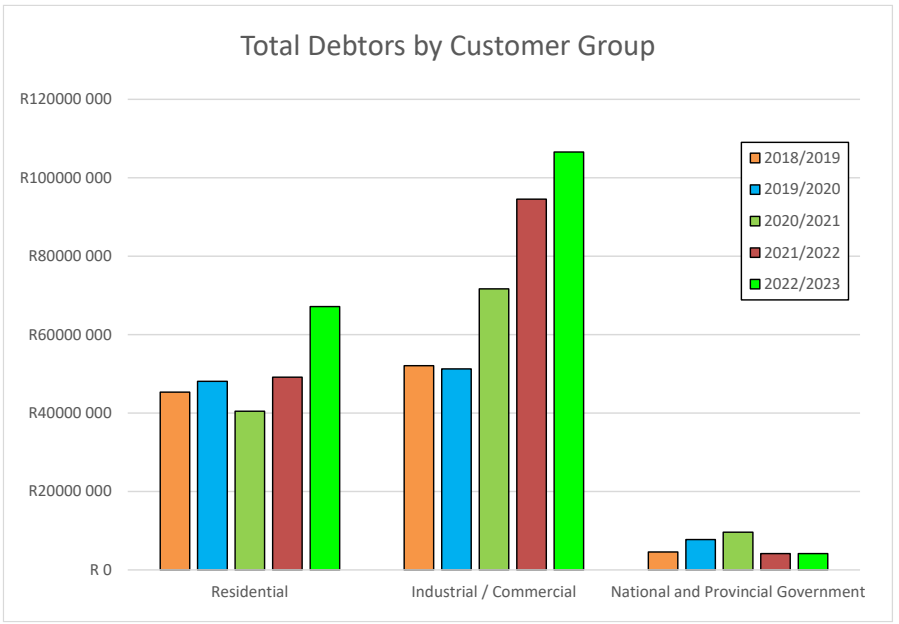


Figure C.3.3.4: Total Debtors by Customer Group for the last five financial years

The table below gives an overview of the debtors' age analysis by income source for the last three financial years (Unaudited figures).

Table C.3.3.8: Analysis of Debtors age by income source as at 30 June for the last three financial years							
Service	**0 – 30 days**	**31 – 60 days**	**61 – 90 days**	**91 – 120 days**	**121 – 365 days**	**Less: Allowance for impairment**	**Total**
2022/2023							
Electricity Tariffs	R77 711 339	R3 664 604	R2 085 740	R1 364 969	R17 823 233	(R10 143 455)	**R92 506 430**
Water Tariffs	R32 999 603	R9 139 812	R7 731 023	R7 339 392	R142 268 097	(R154 519 060)	**R44 958 867**
Sewerage	R11 813 259	R4 035 742	R3 293 101	R2 894 268	R55 446 341	(R59 684 575)	**R17 798 136**
Refuse	R11 742 185	R4 162 957	R3 397 669	R2 988 134	R52 995 438	(R57 792 888)	**R17 493 495**
Housing loans instalments	R15 814	R10 887	R10 925	R9 087	R627 752	(R635 951)	**R38 514**
Housing rental	R38 425	R18 721	R11 825	R8 437	R393 957	(R380 953)	**R90 412**
Other	R1 684 582	R809 413	R17 367	R358 413	R13 883 961	(R11 762 375)	**R4 991 361**
Total	**R136 005 207**	**R21 842 136**	**R16 547 650**	**R14 962 700**	**R283 438 779**	**(R294 919 257)**	**R177 877 215**
2021/2022							
Electricity Tariffs	R72 151 506	R3 469 398	R1 276 744	R624 748	R14 495 231	(R7 480 687)	**R84 536 940**
Water Tariffs	R26 248 845	R6 255 557	R5 776 738	R4 533 353	R117 256 125	(R127 844 665)	**R32 225 953**
Sewerage	R9 049 059	R2 787 673	R2 118 685	R1 780 688	R39 085 481	(R40 852 371)	**R13 969 215**
Refuse	R8 234 519	R2 569 361	R1 933 564	R1 655 823	R35 570 636	(R37 556 262)	**R12 407 641**
Housing loans instalments	R45 312	R10 606	R8 344	R8 081	R559 585	(R609 673)	**R22 255**
Housing rental	R107 729	R27 490	R12 089	R8 937	R345 338	(R380 122)	**R121 461**
Other	R1 687 456	R537 502	R488 272	R344 772	R13 050 274	(R11 548 475)	**R4 559 801**
Total	**R117 524 426**	**R15 657 587**	**R11 614 436**	**R8 956 402**	**R220 362 670**	**(R226 272 255)**	**R71 743 266**
2020/2021							
Electricity Tariffs	R61 374 453	R4 767 845	R2 458 573	R1 662 358	R13 427 588	(R12 775 443)	**R70 915 374**
Water Tariffs	R23 437 851	R5 754 622	R4 941 499	R4 431 907	R105 151 568	(R117 778 529)	**R25 938 918**
Sewerage	R9 489 386	R2 853 960	R2 190 451	R1 841 067	R30 031 114	(R34 046 826)	**R12 359 152**
Refuse	R8 600 419	R2 649 453	R2 005 850	R1 689 782	R26 462 909	(R30 260 971)	**R11 147 442**
Housing loans instalments	R22 036	R9 500	R9 500	R9 483	R552 766	(R573 357)	**R30 198**
Housing rental	R48 705	R16 094	R12 279	R11 811	R254 540	(R288 868)	**R54 561**
Other	R1 026 386	R434 992	R482 260	R267 047	R11 915 131	(R12 877 029)	**R1 247 787**
Total	R103 999 236	R16 486 466	R12 100 412	R9 913 455	R175 880 485	(R208 601 023)	R121 693 432

The table below gives an overview of the debtors' age analysis by customer group for the last three financial years (Unaudited figures).

Table C.3.3.9: Analysis of Debtors age by customer group as at 30 June for the last three financial years							
Service	**0 – 30 days**	**31 – 60 days**	**61 – 90 days**	**91 – 120 days**	**121 – 365 days**	**Less: Allowance for impairment**	**Total**
2022/2023							
Residential	R45 461 293	R17 376 962	R14 124 144	R13 164 440	R260 805 315	(R283 807 560)	**R67 124 594**
Industrial / Commercial	R85 619 419	R4 198 932	R2 327 873	R1 776 730	R23 774 088	(R11 102 102)	**R106 594 940**
National and Provincial Government	R3 349 268	R266 243	R95 634	R21 529	R434 603	(R9 596)	**R4 157 681**
Total	**R134 429 980**	**R21 842 137**	**R16 547 651**	**R14 962 699**	**R285 014 006**	**(R294 919 258)**	**R177 877 215**
2021/2022							
Residential	R36 496 166	R11 416 396	R9 995 660	R8 009 222	R199 253 874	(R216 005 315)	**R49 166 003**
Industrial / Commercial	R76 793 311	R3 932 095	R1 585 885	R930 800	R21 581 109	(R10 266 709)	**R94 556 491**
National and Provincial Government	R2 988 996	R309 097	R32 890	R16 381	R773 640	(R233)	**R4 120 771**
Total	**R116 278 473**	**R15 657 588**	**R11 614 435**	**R8 956 403**	**R221 608 623**	**(R226 272 257)**	**R147 843 265**
2020/2021							
Residential	R36 340 299	R10 466 611	R8 805 383	R7 671 802	R169 786 038	(R192 633 375)	**R40 436 758**
Industrial / Commercial	R62 451 114	R4 778 128	R2 079 777	R1 241 406	R16 828 780	(R15 725 681)	**R71 653 524**
National and Provincial Government	R4 591 226	R1 241 726	R1 251 253	R1 000 247	R1 796 664	(R241 967)	**R9 603 149**
Total	**R103 382 639**	**R16 486 466**	**R12 100 413**	**R9 913 455**	**R188 411 482**	**(R208 601 023)**	**R121 693 432**

C.4. Water Quality

C.4.1. Sampling Programme

Comprehensive Operational and Compliance Water Quality and Final Effluent Monitoring Programmes are implemented by George Municipality. The tables below give an overview of George Municipality's Network Compliance Monitoring Programmes for potable water quality for the various water distribution systems.

Table C.4.1.1: Sampling Programme for Potable Water Quality

Treated Water Schemes: George Network Compliance Monitoring Programme

Registered Sites per Scheme		Active (yes/no)			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2022/23	FY2021/22	FY2020/21		FY2022/23	FY2021/22	FY2020/21
46150	Pacaltsdorp Police Station (Beach Road)	Yes	Yes	Yes	**Microbiological (Health)**			
30080	Pacaltsdorp (Total Garage)	Yes	Yes	Yes	Escherichia Coli (Count per 100ml)	15	15	15
47921	Herolds Bay (Cafe)	Yes	Yes	Yes				
22702	Airport Tap	Yes	Yes	Yes	**Aesthetic**			
26336	Blanco Clinic (Kitchen)	Yes	Yes	Yes	Colour (mg/l)	15	15	15
33817	York Street (Civil Engineering Offices)	Yes	Yes	Yes	Conductivity at 25 °C (mS/m)	15	15	15
23458	Denneoord Hennar's Dann Superette	Yes	Yes	Yes	Total Dissolved Solids (mg/l)	15	15	15
22100	Garden Route (Mall Toilets)	Yes	Yes	Yes	Chloride as Cl (mg/l)	15	15	15
45237	Le Vallia Post Office	Yes	Yes	Yes	Iron as Fe (µg/l)	15	15	15
27278	Lawaai Kamp Clinic (Kitchen)	Yes	Yes	Yes	Managanese as Mn (µg/l)	15	15	15
32642	Thembalethu Taxi Rank (Kitchen)	Yes	Yes	Yes				
49062	Water Camp Tap	Yes	Yes	Yes	**Operational**			
					pH at 25°C	15	15	15
					Turbidity NTU	15	15	15
					Aluminium as Al (µg/l)	15	15	15
					Total Coliforms count per 100 ml	15	15	15
					Disinfectant Residual			
					Free Chlorine (mg/l)	15	15	15
					Not in STD / Limit Set			
					Calcium Hardness as CaCO3 (mg/l)	15	15	15
					Magnesium Hardness as CaCO3 (mg/l)	15	15	15
					Total Hardness as CaCO3 (mg/l)	15	15	15
					Alkalinity as CaCO3 (mg/l)	15	15	15
					Calcium as Ca (mg/l)	15	15	15
					Magnesium as Mg (mg/l)	15	15	15

Table C.4.1.1: Sampling Programme for Potable Water Quality

Treated Water Schemes: Wilderness Network Compliance Monitoring Programme

Registered Sites per Scheme		Active (yes/no)			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2022/23	FY2021/22	FY2020/21		FY2022/23	FY2021/22	FY2020/21
47312	Wilderness Kwik Spar	Yes	Yes	Yes	**Microbiological (Health)**			
34409	Wilderness Heights Bundu Supersave	Yes	Yes	Yes	Escherichia Coli (Count per 100ml)	15	15	15
49445	Hoekwil Post Office	Yes	Yes	Yes				
32747	Touwsranten Community Hall	Yes	Yes	Yes	**Aesthetic**			
22347	Kleinkrantz (at WWTP)	Yes	Yes	Yes	Colour (mg/l)	15	15	15
					Conductivity at 25 °C (mS/m)	15	15	15
					Total Dissolved Solids (mg/l)	15	15	15
					Chloride as Cl (mg/l)	15	15	15
					Iron as Fe (µg/l)	15	15	15
					Managanese as Mn (µg/l)	15	15	15
					Operational			
					pH at 25°C	15	15	15
					Turbidity NTU	15	15	15
					Aluminium as Al (µg/l)	15	15	15
					Total Coliforms count per 100 ml	15	15	15
					Disinfectant Residual			
					Free Chlorine (mg/l)	15	15	15
					Not in STD / Limit Set			
					Calcium Hardness as CaCO3 (mg/l)	15	15	15
					Magnesium Hardness as CaCO3 (mg/l)	15	15	15
					Total Hardness as CaCO3 (mg/l)	15	15	15
					Alkalinity as CaCO3 (mg/l)	15	15	15
					Calcium as Ca (mg/l)	15	15	15
					Magnesium as Mg (mg/l)	15	15	15

Table C.4.1.1: Sampling Programme for Potable Water Quality								
Treated Water Schemes: Uniondale and Haarlem Network Compliance Monitoring Programme								
Registered Sites per Scheme		Active (yes/no)			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2022/23	FY2021/22	FY2020/21		FY2022/23	FY2021/22	FY2020/21
	Uniondale				**Microbiological (Health)**			
48128	Final at WTW	Yes	Yes	Yes	Escherichia Coli (Count per 100ml)	15	15	15
48130	Clinic	Yes	Yes	Yes				
48129	Municipal Office	Yes	Yes	Yes	**Aesthetic**			
	Haarlem				Colour (mg/l)	15	15	15
48131	Final at WTW	Yes	Yes	Yes	Conductivity at 25 °C (mS/m)	15	15	15
48132	Clinic	Yes	Yes	Yes	Total Dissolved Solids (mg/l)	15	15	15
					Chloride as Cl (mg/l)	15	15	15
					Iron as Fe (µg/l)	15	15	15
					Managanese as Mn (µg/l)	15	15	15
					Operational			
					pH at 25°C	15	15	15
					Turbidity NTU	15	15	15
					Aluminium as Al (µg/l)	15	15	15
					Total Coliforms count per 100 ml	15	15	15
					Disinfectant Residual			
					Free Chlorine (mg/l)	15	15	15
					Not in STD / Limit Set			
					Calcium Hardness as CaCO3 (mg/l)	15	15	15
					Magnesium Hardness as CaCO3 (mg/l)	15	15	15
					Total Hardness as CaCO3 (mg/l)	15	15	15
					Alkalinity as CaCO3 (mg/l)	15	15	15
					Calcium as Ca (mg/l)	15	15	15
					Magnesium as Mg (mg/l)	15	15	15

The operational water sampling programmes of George Municipality complies with the minimum monitoring requirements of the SANS 241-2:2015 (Table 1: Minimum monitoring for prescribed process risk indicators) for the various WTWs and distribution systems.

The table below indicates the compliance of the E.Coli monitoring frequency in the water distributions systems of George Municipality, in terms of the minimum requirements of SANS: 241-2: 2015 (Table 2). The period assessed was for samples taken from July 2022 to June 2023.

Table C.4.1.2: George Municipality's compliance of the monthly E.Coli monitoring frequency in the water distributions systems in terms of the minimum requirements of SANS 241-2:2015 (Table 2).			
Distribution System	**Population served**	**Required number of monthly samples (SANS 241-2:2015: Table 2)**	**Number of monthly E.Coli samples taken by Municipality during 2022/2023 ***
George and Wilderness	223 254	44.7	55.9
Uniondale	5 937	2	13.0
Haarlem	2 651	2	8.9

Note: * Include E.Coli samples taken at the WTWs

It can be noted from the above table that the number of monthly E.Coli samples taken over the last financial year for the George/Wilderness, Uniondale and Haarlem distribution systems were adequate.

The tables below give an overview of George Municipality's compliance sampling programme for wastewater (final effluent) quality.

Table C.4.1.3: Sampling Programme for Wastewater Effluent Quality (Outeniqua, Gwaing, Kleinkrantz and Uniondale)								
Registered Sites		Active			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2022/23	FY2021/22	FY2020/21		FY2022/23	FY2021/22	FY2020/21
1	Outeniqua	Yes	Yes	Yes	**Microbiological**			
2	Gwaing	Yes	Yes	Yes	E Coli (org/100mℓ)	7	7	7
3	Kleinkrantz	Yes	Yes	Yes				
4	Uniondale	Yes	Yes	Yes	**Chemical**			
					Ammonia as N (mg/ℓ)	7	7	7
					Nitrate Nitrogen (mg/ℓ)	7	7	7
					Ortho-Phosphate (mg/ℓ)	7	7	7
					COD (mg/ℓ)	7	7	7
					Physical			
					Free Chlorine (mg/ℓ)	7	7	7
					Electrical Conductivity (mS/m)	7	7	7
					pH	7	7	7
					TSS (mg/ℓ)	7	7	7

Table C.4.1.3: Sampling Programme for Wastewater Effluent Quality (Herolds Bay and Haarlem)								
Registered Sites		Active			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2022/23	FY2021/22	FY2020/21		FY2022/23	FY2021/22	FY2020/21
1	Herolds Bay	Yes	Yes	Yes	**Microbiological**			
2	Haarlem	Yes	Yes	Yes	E Coli (org/100mℓ)	7	7	7
					Chemical			
					Ammonia as N (mg/ℓ)	7	7	7
					Nitrate Nitrogen (mg/ℓ)	7	7	7
					Ortho-Phosphate (mg/ℓ)	7	7	7
					COD (mg/ℓ)	7	7	7
					Physical			
					Electrical Conductivity (mS/m)	7	7	7
					pH	7	7	7
					TSS (mg/ℓ)	7	7	7

George Municipality's Water Quality Policy Statement is as follows:

"George Municipality will at all times, when reasonably possible, provide drinking water that is safe, palatable and aesthetically appealing. Drinking water should not contain chemical, microbial or any other substances that is deleterious to health. The water produced will comply for at least 99% of the time with the microbiological requirements, 95% of the time with Class I and 97% of the time with Class II drinking water quality standards as specified in the latest SANS 241 national standard for drinking water."

The table below provides some additional information on George Municipality's Water and Wastewater Quality Monitoring Programmes.

Table C.4.1.4: George Municipality's Water and Wastewater Quality Monitoring Programme	
Sampling Schedule	
Water distribution networks George and Wilderness	2 / Month
Water distribution networks Uniondale and Haarlem	4 / Month
New and Old George WTWs	1 / Week (Raw) and 2 / Week (Final)
Wilderness WTW	1 / Week (Raw) and 1 / Week (Final)
Uniondale and Haarlem WTWs	1 / Week (Raw and Final)
Rivers	4 / Month
Outeniqua, Gwaing, Kleinkrantz and Uniondale Activated Sludge Systems (WWTWs)	4 / Month
Herolds Bay and Haarlem Oxidation Dam Systems (WWTWs)	4 / Month
Industries	4 / Month
Operational Monitoring for WTW by Internal Lab	**Sites**
New George WTW (per process unit x 2 units = 20 Ml/d)	Inlet Works – Raw Water Before Filtration (By Process Controllers) After Filtration (By Process Controllers) Clearwater Well – Final
Old George WTW (per process unit x 3 units = 20.5 Ml/d)	Inlet Works – Raw Water Before Filtration (By Process Controllers) After Filtration (By Process Controllers) Clearwater Well – Final
Wilderness WTW (1 Unit)	Inlet Works – Raw Water After Primary and Secondary Settling Tanks (By Process Controllers) Clearwater Well – Final
Uniondale and Haarlem WTWs	Inlet Works – Raw Water Clearwater Well - Final
Operational Monitoring for WWTW by Internal Lab	**Sites**
Outeniqua WWTW	Influent, Aeration Ditch, Clarifier No1, No.2 & No3, Final Effluent, Up Stream, Down Stream
Gwaing WWTW	Influent, Anoxic, Aerobic, Clarifier No1 & No2, Final Effluent, Final Pond, Up Stream Bridge, Down Stream (1.5km)
Kleinkrantz WWTW	Influent, Anoxic, Aeration Ditch, Clarifier No1 & No2, Final Effluent
Herolds Bay WWTW	Pond 1, Final Effluent Pond 8
Uniondale WWTW	Influent, Anoxic, Ditch, Clarifier No1 & No2, Final Effluent
Haarlem WWTW	Influent, Pond 1 and Pond 3
Compliance Monitoring on water distribution networks	
George Sites: Police Station (Beach Road), Pacaltsdorp (Total Garage), Herolds Bay (Cafe), Blanco (Clinic), Denneoord (Superette), Garden Route (Mall), Le Vallia (Post Office), Lawaai Kamp (Clinic) and Thembalethu (Taxi Rank), Civil Engineering Offices (York Street), Airport tap, Water Camp Tap	
Wilderness Sites: Wilderness Kwik Spar, Wilderness Heights (Bundu Supersave), Hoekwil (Shop), Touwsranten (Community Hall) and Kleinkrantz (at WWTW)	
Uniondale Sites: Clinic and Municipal Office	
Haarlem Sites: Clinic	

The Operational and Compliance Sampling Programmes implemented by the Process Controllers at the various treatment plants and by George Municipality's internal laboratory are also indicated on the Process Flow Diagrams (PFDs) of the WTWs and WWTWs, as included in the Municipality's Water Safety Plans and W2RAPs. The current parameters sampled, sampling points and sample frequency are also indicated on the PFDs.

Operational Monitoring: The objectives of operational monitoring are for George Municipality to monitor each control measure in a timely manner to enable effective system management and to ensure that health-based targets are achieved. It ensures that all the risks identified during the risk assessment process are adequately monitored and that the drinking water quality requirements as set out in SANS:241 are fully complied with. Appropriate data capturing and record keeping systems are in place to satisfy the requirements of the Water Services Act.

Operational sampling is done on a frequent basis by the treatment plant personnel at the various WTWs. The Water quality results from operational monitoring are used as a trigger for immediate short – term corrective action to operational procedures, to improve drinking water quality.

Compliance Monitoring: Compliance monitoring is the final check to ensure that the water delivered is safe to consume.

George Municipality actively implement their Operational and Compliance Water and Effluent Quality Sampling Programmes in order to promptly identify water and effluent quality failures and to react accordingly. The water quality compliance sample results and the final effluent quality compliance sample results are loaded onto DWS's IRIS System via the internet. Once entered the water quality data is automatically compared to SANS:241:2015. These real-time systems allow for immediate intervention to rectify any problems.

Up to present it was not necessary to take any steps to inform the consumers of any health risk regarding the potable water supplied by George Municipality. Safety Management Procedures are however in place, to inform the Municipality's consumers about any potential health risks regarding the water quality, should it become necessary.

The table below gives an overview of the compliance with regard to the water quality and final effluent compliance sampling programmes, as taken from the DWS IRIS.

Table C.4.1.5: Compliance to the Sampling Programme (s)

Measurable / Enabling Factor	Unit	Year 0 FY2022/23						Year-1 FY2021/22						Year-2 FY2020/21					
		MAH	CAH	CCH	CNA	O	D	MAH	CAH	CCH	CNA	O	D	MAH	CAH	CCH	CNA	O	D
Potable Water Quality																			
Supply system submissions	Nr registered	Information not available on IRIS						Information not available on IRIS						Information not available on IRIS					
	Nr submitted																		
	Annual %																		
Monitoring compliance	Average %																		
Certified Data	Average %	100%	-	100%	100%	100%	100%	100%	-	67%	100%	75%	0%	100%	-	67%	100%	75%	0%
In-Time Submission	Annual %	100%	-	100%	100%	100%	100%	77%	-	77%	77%	77%	77%	99%	-	99%	99%	99%	99%
Wastewater Quality																			
		M	C	P	O			M	C	P	O			M	C	P	O		
Monitoring compliance	Average %	85%	88%	90%	-			96%	97%	96%	-			94%	95%	95%	-		
Certified Data	Average %	100%	100%	100%	-			36%	38%	60%	-			36%	38%	59%	-		
In-Time Submission	Average %	100%	100%	100%	-			87%	85%	86%	-			84%	83%	83%	-		

Legend Water **MAH**: Microbiological Acute Health; **CAH**: Chemical Acute Health; **CCH**: Chemical Chronic Health; **CNA**: Chemical Non Health Aesthetic; **O**: Operational; **D**: Disinfectant

Legend Wastewater **M**: Microbiological; **C**: Chemical; **P**: Physical; **O**: Operational

The table below gives an overview of the water quality monitoring from the WSDP Guide Framework perspective.

Table C.4.1.6: Water Quality Monitoring Overview from WSDP Guide Framework Perspective

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2022/23	Year - 1 FY2021/22	Year - 2 FY2020/21
6.3	**Water Supply and Quality**				
6.3.2	Process Control in place	yes/total WTW in %	100%	100%	100%
6.3.3	Monitoring Programme in place	yes/total schemes in %	100%	100%	100%
6.3.4	Sample Analysis Credibility	Average %	100%	100%	100%
9.2	**Monitoring**				
9.2.1	% of water abstracted monitored: Surface water	Q monitored / Q abstracted in %	100%	100%	100%
9.2.2	% of water abstracted monitored: Ground water	Q monitored / Q abstracted in %	100%	100%	100%
9.2.3	% of water abstracted monitored: External Sources (Bulk purchase)	Q monitored own / Q purchased in %	N/A	N/A	N/A
9.2.6	Water quality for formal schemes? (1: daily, 2: weekly, 3: monthly, 4: annually, 5: never)	frequency	Daily	Daily	Daily
9.2.7	Water quality for rudimentary schemes? (1: daily, 2: weekly, 3: monthly, 4: annually, 5: never)	frequency	N/A	N/A	N/A
9.2.9	Is the number sufficient in accordance to the SANS241 requirements?	yes/no	Yes	Yes	Yes
9.3	**Water Quality**				
	Is there a water safety plan in place?	yes/no	Yes	Yes	Yes
9.3.1	Reporting on quality of water taken from source: urban & rural	yes/total schemes in %	100%	100%	100%
9.3.5	Quality of water taken from source: urban - % monitored by WSA self?	monitored by WSA / total schemes in %	100%	100%	100%
9.3.6	Quality of water taken from source: rural - % monitored by WSA self?	monitored by WSA / total schemes in %	N/A	N/A	N/A
9.3.9	Are these results available in electronic format?	yes/no	Yes	Yes	Yes

The table below gives an overview of the wastewater quality monitoring from the WSDP Guide Framework perspective.

Table C.4.1.7 : Wastewater Quality Monitoring Overview from WSDP Guide Framework Perspective

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2022/23	Year - 1 FY2021/22	Year - 2 FY2020/21
5.3.1	**Monitoring and Sample Failure**				
5.3.1.1	Monitoring: % of tests performed as required by general limits /special limits/ license requirements (Average % over previous 12 months)	Annual %	88%	96%	95%
5.3.1.2	Operational: % of tests performed as required by general limits /special limits/ license requirements (Average % over previous 12 months)	Annual %	Not captured on IRIS and recorded by Process Controllers at each of the WWTW		
6.4	**Wastewater Supply and Quality**				
6.4.2	Process Control in place	yes/total WWTW in %	Yes	Yes	Yes
6.4.3	Monitoring Programme in place	yes/total WWTW in %	Yes	Yes	Yes
6.4.4	Sample Analysis Credibility	Average %	100%	100%	100%
9.2	**Monitoring**				
9.2.10	Is the number sufficient in accordance to licences?	yes/no	Yes	Yes	Yes
9.3	**Water Quality**				
	Is there a wastewater risk abatement plan in place?	yes/no	Yes	Yes	Yes
9.3.2	Quality of water returned to the resource: urban	yes/total WWTW in %	100%	100%	100%
9.3.3	Quality of water returned to the resource: rural	yes/total WWTW in %	N/A	N/A	N/A
9.3.7	Quality of water returned to resource: urban - % monitored by WSA self?	monitored by WSA / urban WWTW in %	100%	100%	100%
9.3.8	Quality of water returned to resource: rural - % monitored by WSA self?	monitored by WSA / rural WWTW in %	N/A	N/A	N/A
9.3.9	Are these results available in electronic format?	yes/no	Yes	Yes	Yes

DWS's Blue Drop Process

The DWS completed the Blue Drop PAT process for the WSAs in 2021. Blue drop status is awarded to those towns that comply with 95% criteria on drinking water quality management. The blue drop performance of George Municipality was summarised as follows in the DWS's 2014 Blue Drop Report, which was the last complete assessment done by the DWS.

Table C.4.1.8: Blue Drop Performance of the Municipality (DWS's 2014 Blue Drop Report)

Municipal Blue Drop Score	2011 – 96.26%, 2012 - 98.12%, 2014 – 82.77%

Regulatory Impression: It is disappointing that the George Local Municipality Blue Drop score has decreased substantially during this assessment. Two key issues have impacted on the municipal compliance. Firstly, the Haarlem and Uniondale systems that were transferred from the Eden District Municipality have been included in the George Local Municipality assessment for the first time and secondly a change in personnel has impacted the ongoing maintenance of information. The inspector specifically identified the need for officials to take ownership of the Water Safety Plan and Risk Assessment in order to ensure mitigation of identified risks.

A number of areas are identified where the George Local Municipality should implement actions to improve compliance. These include:

- Risk based monitoring programmes to comply with the requirements of SANS 241 with regard to sampling points, frequency of analyses and the determinants that are analysed. This includes a water quality risk assessment of the catchment, treatment and reticulation network water in all systems and the compliance monitoring programme. Water quality failures detected during the SANS analysis have not been included as risks and monitored accordingly. Limited chemical determinants have been monitored, specifically in the network system, to assess potential health impacts.
- Ensure that outstanding information required to finalise the registration and classification of process controllers is uploaded to the BDS, as well as the allocation of supervisors to each system. Appropriate training should be provided to meet the skills requirements for the future compliance with Regulations 17.
- Results of compliance monitoring should be timeously uploaded to the BDS.
- Acceptable levels of compliance from the proficiency testing scheme in which the municipal laboratory participates.

It is anticipated that with commitment and management support, that George Local Municipality will improve compliance and once again achieve the coveted Blue Drop status in the next assessment.

Performance Area	George	Haarlem	Uniondale	Wilderness
Water Safety Planning	**26.78**	**19.25**	**23.45**	**25.03**
Treatment Process Management	**6.80**	**4.00**	**4.00**	**6.00**
DWQ Compliance	**23.25**	**16.35**	**23.10**	**16.50**
Management, Accountability	**8.80**	**8.50**	**8.50**	**8.80**
Asset Management	**11.59**	**10.33**	**10.54**	**11.06**
Use Efficiency, Loss Management	**2.64**	**2.64**	**2.64**	**2.64**
Bonus Scores	3.48	3.21	3.96	5.62
Penalties	0.00	0.00	0.00	0.00
Blue Drop Score (2014)	**83.33%**	**64.28%**	**76.18%**	**75.65%**
Blue Drop Score (2012)	98.56%	N/A	N/A	85.47%
Blue Drop Score (2011)	96.32%	N/A	N/A	95.00%
System Design Capacity (Ml/d)	45.000	1.000	1.500	1.800
Operational Capacity (% i.t.o. Design)	59%	30%	37%	43%
Average daily consumption (l/p/d)	163.9	85.7	160.0	41.6
Microbiological Compliance (%)	**99.8%**	**98.0%**	**99.3%**	**99.3%**
Chemical Compliance (%)	**79.4%**	**99.9%**	**97.8%**	**88.2%**

George Municipality also received their 2022 Blue Drop Risk Ratings early this year, as calculated from the 2021 assessment done by the DWS.

Table 4.1.9: BDRR for the George Municipality's water supply system (2022)

WSA Overview	
The George WSS, Haarlem WSS, Uniondale WSS and Wilderness WSS falls in the low-risk category.	
Criteria A:	The design capacities for the four Water Treatment Works were provided.
Criteria B:	The George WSS is operating within its design capacity. The Haarlem WSS, Uniondale WSS and Wilderness WSS indicates no presence of operational flow management.
Criteria C:	All the WSS achieved excellent compliance (>98%) for Microbiological compliance and Microbiological Monitoring compliance (>80%). The Uniondale WSS and Wilderness WSS achieved excellent compliance for Chemical compliance (>98%). George WSS and Haarlem WSS achieved excellent compliance. None of the Water Treatment Works achieved compliance for Chemical Monitoring compliance.
Criteria D:	None of the four WSS achieved excellent compliance (100%) for technical skills, which is an indication of inadequate

Table 4.1.9: BDRR for the George Municipality's water supply system (2022)				
WSA Overview				
presence of relevant process controllers, supervisors and maintenance teams.				
Criteria E: The Water Supply Systems achieved non-compliance for the Water Safety Planning and development of risk-based water quality monitoring programmes as outlined in SANS 241:2015.				
The Regulator encourages the WSA and WSP to urgently implement the following recommendations to ensure delivery of safe drinking water for all consumers:				
A and B: Installation of calibrated inflow meters to verify operational capacity.				
Ca: Implementation of corrective measures in the event of microbiological and chemical failures to always ensure the delivery of safe drinking water.				
Cb: Implementation of monitoring programmes with sufficient samples based on population size as outlined in SANS 241:2015.				
D: Appointment of suitably qualified staff (supervisors, process controllers and maintenance teams) aligned to set criteria.				
E: Development of Water Safety Plan as per SANS 241:2015 and WHO guidelines including risk assessment of entire supply system, water quality evaluation based on full SANS 241:2015 analysis of raw and final water, development of risk-based monitoring programmes and implementation of mitigating measures to address all medium and high risks.				
Assessment Areas	**George Water Works**	**Wilderness Water Works**	**Uniondale Water Works**	**Haarlem Water Works**
A: Total Design Capacity (Ml/d)	46.000	1.500	1.500	1.000
B: % Operational Capacity in terms of design	73.3%	0%	0%	0%
C1a: % Microbiological Compliance	100%	100%	100%	100%
C1b: % Microbiological Monitoring Compliance	97.2%	100%	100%	100%
C2a: % Chemical Compliance	96.4%	98.5%	99.6%	96.2%
C2b: % Chemical Monitoring Compliance	14.7%	14.7%	14.7%	17.7%
D: % Technical Skills	37.5%	75%	37.5%	56.3%
E: % Water Safety Plan Status	0%	0%	0%	0%
% BDRR/BDRR max	**41.1%**	**25.9%**	**27.6%**	**31.6%**

The average daily residential billed metered consumption (l/p/d) for the last four financial years are summarised in the table below.

Table C.4.1.10: Average residential daily billed metered consumption (l/p/d) for the last four financial years.						
Distribution System	**2022/2023**			**2021/2022**		
	Estimated Permanent Population	**Aver. Daily Residential Consumption (kl)**	**Aver. Daily consumption (l/p/d)**	**Estimated Permanent Population**	**Aver. Daily Residential Consumption (kl)**	**Aver. Daily consumption (l/p/d)**
George and Wilderness	223 254	15 648	**70**	217 173	15 828	**73**
Uniondale	5 937	375	**63**	5 792	364	**63**
Haarlem	2 651	238	**90**	2 625	201	**77**
Distribution System	**2020/2021**			**2019/2020**		
	Estimated Permanent Population	**Aver. Daily Residential Consumption (kl)**	**Aver. Daily consumption (l/p/d)**	**Estimated Permanent Population**	**Aver. Daily Residential Consumption (kl)**	**Aver. Daily consumption (l/p/d)**
George and Wilderness	211 258	15 138	**72**	205 504	14 668	**71**
Uniondale	5 651	392	**69**	5 513	394	**71**
Haarlem	2 599	205	**79**	2 573	211	**82**

It can be noted from the above table that the average daily residential water usage per person (residential consumption after household meter, which exclude leakages on the network and the other water usages, for example industrial and commercial usage) is very low for all three areas and that the potable water is used conservatively by the residential consumers.

DWS's Green Drop Process

The DWS completed the new Green Drop assessment for the WSAs in 2021 and the results were received early in 2022. Green drop status is awarded to those WSAs that comply with 90% criteria on key selected indicators on wastewater quality management. The green drop performance of George Municipality is summarised as follows in the DWS's 2022 Green Drop Report.

Table 4.1.10: Green Drop Performance of the George Municipality (DWS's 2022 Green Drop Report)	
Average Green Drop Score	**2009 – 94.0%, 2011 – 91.0%, 2013 – 85.0%, 2021 – 74.0%**

Regulator's Comment: The George Municipality team were well prepared for the 2021 Green Drop Audit and displayed a good effort in ensuring compliance with the Green Drop criteria, particularly since most of the team had not been exposed to the audit process before. The overall municipal performance has shown a decline from 85% (2013) to 74% (2021). This must be seen against the backdrop of continuously more stringent requirements of the Green Drop programme, the new team members who are unfamiliar with the audit standards, and the rapidly expansion of George. Maintenance team capacity and financial management as well as operational and compliance monitoring programmes was found to be at a very high standard with only minor improvements to be made. The overall management of the wastewater business is commendable and performance in this regard is reflected in the relatively good final effluent quality at most plants. All the systems obtained low risk ratings – well done. Microbiological compliance at Gwaing WWTW is a concern that needs to be addressed.

The biggest decline noted was the discontinuation of the W_2RAP process. The W_2RAPs for the respective systems and associated risk registers was seemingly last updated in 2015. The weighting of this requirement has increased from prior audits and thus the lack of implementation during the audit year has adversely impacting on performance. In addition to this, new scoring components relating to sludge management and sewer network inspections and maintenance also scored poorly. Sludge management across all systems is a concern that requires a concerted effort to address, this was reiterated during the technical site audit where the poor state of sludge management was physically observed. The municipality will benefit from reinstating and updating the W_2RAP process to identify, prioritise and systematically address the highest risks associated with the respective systems to ensure improvement. The Regulator is looking forward to the 2023 audits and hope to see George breaking the 85% Green Drop mark once again.

Green Drop findings:

1. Maintenance capacity of all systems was well managed, process controller compliance with regulatory requirements however required attention
2. W_2RAPs were outdated and no recent risk registers were available
3. Operational and compliance monitoring programmes were in place for all systems with minor shortcomings related to compliance with Water use authorisation/licence monitoring requirements noted.
4. The internal municipal laboratory is used for compliance and environmental monitoring, and although the laboratory took part in a proficiency testing scheme, Z-scores were poor. Intervention to ensure sufficient laboratory services capacity and credibility is required.
5. Financial management information in terms of costing and expenditure was provided per WWTW, but the overall approved budgets were only provided for the whole wastewater unit. Production cost per system needs attention.
6. Energy efficiency data was readily available, however none of the plants conducted energy efficiency audits thereby potentially forfeiting some optimisation and cost reduction benefits.
7. Flow measurement data was available for all systems except Haarlem.
8. All WWTWs were operating within their design capabilities and management of this is well planned for.
9. Process audits were conducted for all WWTWs, but not proof of implementation of the recommendations highlighted was provided – these findings should be used to update the risk plans.
10. No proof of network inspections and condition assessments was provided, wastewater balances should be prioritized.
11. Good and updated asset registers were available but no proof of its linkage to preventative maintenance plans was provided.
12. Bylaws and proof of enforcement was available.
13. Inflow and final effluent data was uploaded on IRIS on a monthly basis.
14. All WWTWs had valid water use authorisations/licences in place.
15. Three (3) of the 6 plants complied with all 3 effluent quality categories, others did well as they complied with two categories and on system does not discharge into the environment.
16. The WWTWs sludge was last classified in 2019 with no recent Sludge Management Plans in place.
    - Outeniqua WWTW was in the process of being upgraded. Budget of R270 000 000 (MIG and municipal funded). Upgrade of WWTW with additional 10Ml to cater for development and growth in the area. Completion of upgrades expected in February 2023.

Table 4.1.10: Green Drop Performance of the George Municipality (DWS's 2022 Green Drop Report)

The Gwaing WWTW was inspected to verify the Green Drop Audit findings (**Technical Site Assessment: Gwaing WWTW 70%):**

- Sections of sewer network and pump station inspected were in good condition, but no evidence of maintenance logbooks was available for assessment.
- Access control was practiced at the WWTW, and the site was adequately sign-posted. The site was generally well-maintained and facilities in good condition although additional safety signage throughout the plant is recommended.
- Plant classification certificate, operational logbooks and O&M manuals were available on-site.
- Operational monitoring equipment was available on-site, in good condition and being used.
- Process flow diagrams and incident management protocols were not displayed.
- A dead cow was found at the inlet works during the audit, which presents a major safety risk in reticulation network.
- All unit processes were functional and no major hardware risks were observed.
- Extensive erosion following excessive stormwater events was noted at the chlorine contact tank area, there are initiatives in place to address this risk.
- Sludge disposal is a major concern as dried sludge is excessively stockpiled on-site on an unlined surface.

GREEN DROP REPORT CARD							
Key Performance Area	**Weight**	**Gwaing**	**Haarlem**	**Herolds Bay**	**Kleinkrantz**	**Outeniqua**	**Uniondale**
A. Capacity Management	15%	78.0%	76.0%	97.5%	88.0%	86.0%	78.0%
B. Environmental Management	15%	34.0%	34.0%	36.3%	30.0%	34.0%	32.0%
C. Financial Management	20%	94.0%	84.0%	92.5%	94.0%	94.0%	84.0%
D. Technical Management	20%	57.5%	42.5%	40.6%	56.5%	53.5%	47.5%
E. Effluent & Sludge Compliance	30%	65.0%	80.0%	100.0%	80.0%	65.0%	80.0%
F. Bonus		38.5%	21.0%	28.5%	21.0%	76.0%	21.0%
G. Penalties		0.0%	-25.0%	0.0%	0.0%	0.0%	0.0%
H. Disqualifiers		None	None	None	None	None	None
Green Drop Score (2021)		**71%**	**64%**	**80%**	**74%**	**76%**	**69%**
2013 Green Drop Score		**91%**	**83%**	**95%**	**90%**	**80%**	**80%**
2011 Green Drop Score		**95%**	**15%**	**65%**	**88%**	**89%**	**1%**
2009 Green Drop Score		**83%**	**0%**	**0%**	**100%**	**100%**	**0%**
System Design Capacity (Ml/d)		11.000	0.170	0.300	2.500	15.000	1.000
Design Capacity Utilisation (%)		68%	NI	44%	27%	51%	70%
Resource Discharged into		Gwaing River	Irrigation	No discharge	Infiltration into dunes	Skaapkop River	Unknown seasonal stream to irrigation dam
Microbiological Compliance (%)		19%	NMR	NMR	100%	93%	91%
Chemical Compliance (%)		96%	100%	NMR	96%	75%	98%
Physical Compliance (%)		99%	100%	NMR	97%	96%	97%
Wastewater Risk Rating (CRR% of CRRmax)							
2011 CRR (%)		**40.9%**	**88.2%**	**23.5%**	**29.4%**	**45.5%**	**100.0%**
2013 CRR (%)		**40.9%**	**41.2%**	**29.4%**	**29.4%**	**50.0%**	**35.3%**
2021 CRR (%)		**40.9%**	**41.2%**	**23.5%**	**29.4%**	**45.5%**	**29.4%**

C.4.2. Water Quality Compliance

The table below gives an overview of George Municipality's water quality compliance, as taken from the DWS IRIS.

Table C.4.2.1: Overview of Water Quality Compliance

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2022/23						Year-1 FY2021/22						Year-2 FY2020/21					
			MAH	CAH	CCH	CNA	O	D	MAH	CAH	CCH	CNA	O	D	MAH	CAH	CCH	CNA	O	D
	Results from Integrated Regulatory Information System																			
n/a	Analysis compliance	Total	919	-	2748	6427	3676	916	842	-	2526	5894	3367	842	820	-	2469	5761	3289	823
n/a		Nr Failures	19	-	19	169	161	34	0	-	11	94	87	491	0	-	15	117	127	486
n/a		Compliance %	98%	-	99%	97%	96%	96%	100%	-	100%	98%	97%	42%	100%	-	99%	98%	96%	41%
n/a	Samples frequency	Total	911	-	910	916	919	908	841	-	841	841	841	841	811	-	814	814	814	814
n/a		Nr Failures	368	-	368	372	373	368	305	-	305	305	305	305	290	-	290	290	290	290
n/a		Compliance %	60%	-	60%	59%	59%	59%	64%	-	64%	64%	64%	64%	64%	-	64%	64%	64%	64%
n/a	Sites compliance	Total	299	-	299	299	299	299	299	-	299	299	299	299	301	-	301	301	301	301
n/a		Nr Failures	67	-	67	67	67	67	60	-	60	60	60	60	60	-	60	60	60	60
n/a		Compliance %	78%	-	78%	78%	78%	78%	80%	-	80%	80%	80%	80%	80%	-	80%	80%	80%	80%
6.3	**Water Supply and Quality**																			
6.3.6	Blue Drop Status	last year certified by DWS	2022 Blue Drop Assessment (Waiting for results)						2021 Blue Drop PAT						No Blue Drop assessment was done by DWS					
9.3	**Water Quality**																			
9.3.10	% Time (days) within SANS 241 standards per year	Average of analysis compliance %	97%						87%						87%					

Legend **MAH**: Microbiological Acute Health; **CAH**: Chemical Acute Health; **CCH**: Chemical Chronic Health; **CNA**: Chemical Non Health Aesthetic; **O**: Operational; **D**: Disinfectant

The table below gives an overview of the number of compliance samples taken over the period July to June for the last three financial years for the various water distribution networks.

Table C.4.2.2: Number of water quality samples taken throughout the various water distribution systems during the last three financial years

Number of Sampling points within distribution system	12	5	3	2	12	5	3	2	12	5	3	2
Parameter Sampled	**2022/2023**				**2021/2022**				**2020/2021**			
	George	**Wilderness**	**Uniondale**	**Haarlem**	**George**	**Wilderness**	**Uniondale**	**Haarlem**	**George**	**Wilderness**	**Uniondale**	**Haarlem**
Free Chlorine	287	124	157	107	289	121	134	89	279	117	128	86
Colour	288	121	158	109	289	121	134	89	279	117	128	86
Conductivity	288	120	154	103	289	121	134	89	279	117	128	86
Total Dissolved Solids	288	120	154	103	289	121	134	89	279	117	128	86
Alkalinity	288	120	154	103	289	121	134	89	279	117	128	86
Total Hardness	288	120	154	103	288	120	132	87	276	115	126	84
Magnesium Hardness	288	120	154	103	288	120	132	87	276	115	126	84
Calcium Hardness	288	120	154	103	288	120	132	87	276	115	126	84
Turbidity	289	121	163	110	289	121	134	89	279	117	128	86
pH	288	121	154	103	289	121	134	89	279	117	128	86
Fluoride	-	-	-	-	1	1	2	2	3	2	2	2
Chloride	288	120	154	103	289	121	134	89	279	117	128	86
Calcium	288	120	154	103	289	121	134	89	279	117	128	86
Magnesium	288	120	154	103	289	121	134	89	279	117	128	86
Copper	-	-	-	-	1	1	2	2	3	2	2	2
Iron	288	120	154	104	289	121	134	89	279	117	128	86
Manganese	288	120	154	103	289	121	134	89	279	117	128	86
Aluminium	288	122	157	103	289	121	134	89	279	117	128	86
E.Coli	289	127	156	107	289	121	134	89	279	117	128	86
Total Coliform Count	289	127	156	107	289	121	134	89	279	117	128	86
Sodium	-	-	-	-	1	1	2	2	3	2	2	2

Table C.4.2.2: Number of water quality samples taken throughout the various water distribution systems during the last three financial years												
Number of Sampling points within distribution system	12	5	3	2	12	5	3	2	12	5	3	2
Parameter Sampled	**2022/2023**				**2021/2022**				**2020/2021**			
	George	**Wilderness**	**Uniondale**	**Haarlem**	**George**	**Wilderness**	**Uniondale**	**Haarlem**	**George**	**Wilderness**	**Uniondale**	**Haarlem**
Potassium	-	-	-	-	1	1	2	2	3	2	2	2
Zinc	-	-	-	-	1	1	2	2	3	2	2	2
Ammonia Nitrogen	-	-	-	-	1	1	2	2	3	2	2	2
Nitrate	-	-	-	-	1	1	2	2	3	2	2	2
Nitrite	-	-	-	-	1	1	2	2	3	2	2	2
Sulphate	-	-	-	-	1	1	2	2	3	2	2	2
Antimony	-	-	-	-	1	1	2	2	3	2	2	2
Arsenic	-	-	-	-	1	1	2	2	3	2	2	2
Cadmium	-	-	-	-	1	1	2	2	3	2	2	2
Chromium	-	-	-	-	1	1	2	2	3	2	2	2
Lead	-	-	-	-	1	1	2	2	3	2	2	2
Mercury	-	-	-	-	1	1	2	2	3	2	2	2
Nickel	-	-	-	-	1	1	2	2	3	2	2	2
Selenium	-	-	-	-	1	1	2	2	3	2	2	2
Uranium	-	-	-	-	1	1	2	2	3	2	2	2
Cyanide	-	-	-	-	1	1	2	2	3	2	2	2
Total Organic Carbon	-	-	-	-	1	1	2	2	3	2	2	2
Monochloramine	-	-	-	-	1	1	2	2	3	2	2	2
Barium	-	-	-	-	1	1	2	2	3	2	2	2
Boron	-	-	-	-	1	1	2	2	3	2	2	2
Chloroform	-	-	-	-	1	1	2	2	3	2	2	2
Bromoform	-	-	-	-	1	1	2	2	3	2	2	2
Dibromochloromethane	-	-	-	-	1	1	2	2	3	2	2	2
Bromodichloromethane	-	-	-	-	1	1	2	2	3	2	2	2
Total Trihalomethanes	-	-	-	-	1	1	2	2	3	2	2	2
Microcystins	-	-	-	-	1	1	2	2	3	2	2	2
Phenols	-	-	-	-	1	1	2	2	3	2	2	2
Heterotrophic Plate Count	-	-	-	-	1	1	2	2	3	2	2	2
Somatic Coliphages	-	-	-	-	1	1	2	2	3	2	2	2
Giardia Species	-	-	-	-	1	1	2	2	3	2	2	2
Cryptosporidium Species	-	-	-	-	1	1	2	2	3	2	2	2
Total	**5 186**	**2 183**	**2 795**	**1 880**	**5 233**	**2 209**	**2 474**	**1 664**	**5 115**	**2 168**	**2 366**	**1 610**

Notes: 1) The water quality samples taken at the Uniondale and Haarlem WTWs are included in the above table.
2) The water quality samples taken at the New George, Old George and Ebb & Flow WWTWs are not included in the above table.

The water quality performance indicators for the water distribution systems in George Municipality is mostly "Excellent", according to the SANS 241:2015 classification. The water quality compliance sample results are included in Annexure D for each of the distribution systems. The overall percentage of compliance of the water quality samples taken over the period July to June for the last three financial years is summarised in the table below per distribution system.

Table C.4.2.3: Percentage compliance of the water quality samples for the last three financial years

Performance Indicator	Performance Indicator categorised as unacceptable Yes / No (Table 4 of SANS 241-2:2015)			% Sample Compliance according to SANS 241-2015 Limits		
	22/23	21/22	20/21	22/23	21/22	20/21
George (Samples taken at WTWs are excluded)						
Acute Health Microbiological	No (Excellent)	No (Excellent)	No (Excellent)	100.0%	100.0%	100.0%
Acute Health Chemical	-	No (Excellent)	No (Excellent)	-	100.0%	100.0%
Chronic Health	No (Excellent)	No (Excellent)	No (Excellent)	100.0%	100.0%	100.0%
Aesthetic	No (Excellent)	No (Excellent)	No (Excellent)	98.7%	99.7%	99.1%
Operational Efficiency	No (Excellent)	No (Excellent)	No (Excellent)	98.9%	99.4%	98.6%
Wilderness (Samples taken at WTW are excluded)						
Acute Health Microbiological	No (Excellent)	No (Excellent)	No (Excellent)	92.9%	100.0%	100.0%
Acute Health Chemical	-	No (Excellent)	No (Excellent)	-	100.0%	100.0%
Chronic Health	No (Excellent)	No (Excellent)	No (Excellent)	100.0%	100.0%	100.0%
Aesthetic	No (Excellent)	No (Excellent)	No (Excellent)	98.8%	99.6%	98.9%
Operational Efficiency	No (Excellent)	No (Excellent)	No (Excellent)	97.7%	99.2%	98.3%
Uniondale (Samples taken at the WTW are included)						
Acute Health Microbiological	No (Excellent)	No (Excellent)	No (Excellent)	98.1%	100.0%	100.0%
Acute Health Chemical	-	No (Excellent)	No (Excellent)	-	100.0%	100.0%
Chronic Health	No (Excellent)	No (Excellent)	No (Excellent)	98.9%	100.0%	100.0%
Aesthetic	No (Excellent)	No (Excellent)	No (Excellent)	98.6%	99.8%	99.1%
Operational Efficiency	No (Excellent)	No (Excellent)	No (Good)	95.4%	97.5%	94.3%
Haarlem (Samples taken at the WTW are included)						
Acute Health Microbiological	Yes (Unacceptable)	No (Excellent)	No (Excellent)	93.5%	100.0%	100.0%
Acute Health Chemical	-	No (Excellent)	No (Excellent)	-	100.0%	100.0%
Chronic Health	No (Excellent)	No (Excellent)	No (Excellent)	98.8%	100.0%	99.5%
Aesthetic	No (Excellent)	No (Good)	No (Good)	93.5%	92.4%	93.0%
Operational Efficiency	Yes (Unacceptable)	Yes (Unacceptable)	Yes (Unacceptable)	88.4%	89.8%	92.2%

The table below gives an overview of the four categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified:

Table C.4.2.4: Four categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified

Category	Risk
Acute Health	Determinand that poses an immediate unacceptable health risk if present at concentration values exceeding the numerical limits specified in this part of SANS 241.
Aesthetic	Determinand that taints water with respect to taste, odour and colour and that does not pose an unacceptable health risk if present at concentration values exceeding the numerical limits specified in SANS 241.
Chronic Health	Determinand that poses an unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits specified in SANS 241.
Operational	Determinand that is essential for assessing the efficient operation of treatment systems and risks from infrastructure

The table below gives an overview of George Municipality's wastewater quality compliance, as taken from the DWS IRIS.

Table C.4.2.5: Overview of Wastewater Quality Compliance

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2022/23				Year-1 FY2021/22				Year-2 FY2020/21			
			M	C	P	O	M	C	P	O	M	C	P	O
	Results from Integrated Regulatory Information System													
n/a	Regulatory compliance	Total	270	834	986	-	260	571	876	-	237	527	800	-
n/a		Nr Failures	47	300	204	-	57	192	69	-	49	181	52	-
n/a		Compliance %	83%	64%	79%	-	78%	66%	92%	-	79%	66%	94%	-
n/a	Operational compliance	Total	Not captured on IRIS and recorded by Process Controllers at each of the WWTW											
n/a		Nr Failures												
n/a		Compliance %												
5.3.1	**Monitoring and Sample Failure**													
5.3.1.3 5.3.1.4 5.3.1.5	Average % of sample failure	Failure %	17%	36%	21%	N/A	22%	34%	8%	N/A	21%	34%	6%	N/A
6.3	**Water Supply and Quality**													
6.4.6	Green Drop Status	last year certified by DWS	2022 Green Drop PAT (Waiting for results)				2021 Green Drop Assessment				No Green Drop assessment was done by DWS			

Legend **M**: Microbiological; **C**: Chemical; **P**: Physical; **O**: Operational

The final effluent quality complies with the authorised Microbiological, Chemical and Physical limits for most of the WWTWs. The compliance percentages of the final effluent samples taken over the period July to June for the last three financial years at the Outeniqua-, Gwaing-, Kleinkrantz-, Herolds Bay-, Uniondale- and Haarlem WWTW are summarised in the tables below.

Table C.4.2.6: Percentage microbiological (E.Coli) compliance of the compliance samples taken at the various WWTWs for the last three financial years

WWTW	2022/2023	2021/2022	2020/2021
Outeniqua	**53.2%**	80.0%	92.9%
Gwaing	**98.0%**	95.7%	100.0%
Kleinkrantz	**64.0%**	97.8%	100.0%
Herolds Bay	**100.0%**	100.0%	100.0%
Uniondale	**90.2%**	93.0%	90.5%
Haarlem	**100.0%**	100.0%	100.0%
Total	**84.5%**	**94.4%**	**97.3%**

Table C.4.2.7: Percentage chemical compliance of the compliance samples taken at the various WWTWs for the last three financial years.

WWTW	2022/2023					2021/2022					2020/2021				
	Ammonia	Nitrites and Nitrates	COD	Ortho-Phosphate	Overall	Ammonia	Nitrites and Nitrates	COD	Ortho-Phosphate	Overall	Ammonia	Nitrites and Nitrates	COD	Ortho-Phosphate	Overall
Outeniqua	74.5%	100.0%	25.5%	97.9%	**74.5%**	88.9%	97.8%	6.7%	100.0%	**73.3%**	78.6%	95.2%	21.4%	100.0%	**73.8%**
Gwaing	98.0%	100.0%	93.9%	98.0%	**97.4%**	97.8%	100.0%	91.3%	100.0%	**97.3%**	95.5%	97.7%	88.6%	100.0%	**95.5%**
Kleinkrantz	100.0%	100.0%	72.0%	88.0%	**89.9%**	100.0%	100.0%	86.7%	100.0%	**96.7%**	100.0%	100.0%	83.7%	100.0%	**95.9%**
Herolds Bay	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**
Uniondale	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**
Haarlem	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**	N/A	N/A	100.0%	N/A	**100.0%**
Total	**91.1%**	**100.0%**	**82.5%**	**94.5%**	**90.0%**	**95.6%**	**99.3%**	**80.5%**	**100.0%**	**91.3%**	**91.5%**	**97.7%**	**82.5%**	**100.0%**	**90.8%**

Table C.4.2.8: Percentage physical compliance of the compliance samples taken at the various WWTWs for the last three financial years.												
WWTW	2022/2023				2021/2022				2020/2021			
	pH	Electrical Conductivity	Suspended Solids	Overall	pH	Electrical Conductivity	Suspended Solids	Overall	pH	Electrical Conductivity	Suspended Solids	Overall
Outeniqua	100.0%	17.0%	61.7%	**59.6%**	100.0%	17.8%	77.8%	**65.2%**	100.0%	9.5%	85.7%	**65.1%**
Gwaing	100.0%	69.4%	100.0%	**89.8%**	100.0%	67.4%	100.0%	**89.1%**	100.0%	59.1%	97.7%	**85.6%**
Kleinkrantz	100.0%	100.0%	98.0%	**99.3%**	97.8%	100.0%	95.6%	**97.8%**	100.0%	100.0%	97.7%	**99.2%**
Herolds Bay	98.0%	100.0%	N/A	**99.0%**	100.0%	100.0%	N/A	**100.0%**	97.7%	100.0%	N/A	**98.9%**
Uniondale	98.0%	100.0%	N/A	**99.0%**	67.4%	100.0%	N/A	**83.7%**	95.2%	100.0%	N/A	**97.6%**
Haarlem	100.0%	100.0%	N/A	**100.0%**	100.0%	100.0%	N/A	**100.0%**	100.0%	100.0%	N/A	**100.0%**
Total	**99.3%**	**81.8%**	**87.0%**	89.9%	**94.4%**	**80.5%**	**91.2%**	**88.2%**	**98.8%**	**78.2%**	**93.8%**	**89.6%**

The final effluent quality compliance sample results are included in Annexure D for each of the WWTWs.

C.4.3. Incident Management

George Municipality's Water Safety Plans were updated during the 2021/2022 financial year. A detailed risk assessment was executed as part of the process and the existing control measures implemented by George Municipality were evaluated. An Improvement / Upgrade Plan is also in place with relevant Water and Safety Management Procedures for any type of incident.

The table below gives an overview of the Medium and High Risks for the various WTWs and water distribution systems, as included in the Water Safety Plans.

Table C.4.3.1: Medium and High risks for the various WTWs and water distribution systems	
Identified Hazards / Risks	**Residual Risk**
George / Wilderness	
Collapse of infrastructure, due to insufficient budget allocation towards operation and maintenance.	Medium
Broken / faulty de-sludge valves, which result in inadequate desludging of sedimentation tanks	Medium
Some of the filter pipework in a poor condition, which can lead to huge water losses if broken or collapse. Some of the filter valves are broken and not working.	Medium
Shortage of chlorine gas from Suppliers. Disinfection chemical supply runs out (WTWs).	Medium
Injury to operational personnel or PCs due to non-compliance with safety requirements at facility (WTWs)	Medium
Capacity of WTW is inadequate	High
Inadequate treated water due to loss or interruption of power supply at plants or the Garden Route Dam.	Medium
Inadequate security at plants, which result in vandalised and damaged infrastructure and inadequate treatment.	Medium
Theft, vandalism or sabotage may pollute the water with chemicals or microbes or damage equipment and infrastructure	Medium
Increase in Water Losses, due to unmetered communal standpipes and ablution facilities	Medium
Uniondale	
Collapse of infrastructure, due to insufficient budget allocation towards operation and maintenance.	Medium
Shortage of chlorine gas. Disinfection chemical supply runs out.	Medium
Injury to operational personnel or PCs due to non-compliance with safety requirements at facility (WTW)	Medium
Theft, vandalism or sabotage may pollute the water with chemicals or microbes or damage equipment and infrastructure	Medium
Increase in Water Losses, due to unmetered communal standpipes and ablution facilities	Medium
Haarlem	
Collapse of infrastructure, due to insufficient budget allocation towards operation and maintenance.	Medium
Theft, vandalism or sabotage may pollute the water with chemicals or microbes or damage equipment and infrastructure	Medium
Increase in Water Losses, due to unmetered communal standpipes and ablution facilities	Medium

Updated W_2RAPs were compiled during the last financial year for each of the WWTWs and sewer drainage networks. The W_2RAP is an all-inclusive risk analysis tool by which risks associated with the management of collection, treatment and disposal of wastewater, are identified and rated (quantified). The identified risks can then be managed according to its potential impacts on the receiving environment / community / resource.

The table below gives an overview of the Medium and High Risks for the various WWTWs and sewer drainage networks, as included in the W_2RAPs.

Table C.4.3.2: Medium and High risks for the various WWTWs and sewer drainage networks	
Identified Hazards / Risks	**Residual Risk**
Outeniqua	
Infrastructure failure on sewer network, at pump stations and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Spillages at sewer pump stations, due to electricity failures	Medium
Spillages at sewer pump stations, due to large foreign objects that cause damage to pump impellers.	Medium
Staff working with chlorine requires refresher training in order to ensure that emergency procedures and action plans are followed during an incident.	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place. Current O&M Manuals are outdated.	Medium
Staff health and safety compromised, since occupational health and safety training is lacking	Medium
Final effluent not meeting required standards, due to increased load on the Carousel Reactor.	Medium
Non-compliance with final effluent standards, because Biological Reactor (Carousel) is not working when there is load shedding.	High
Non-compliance with final effluent standards, because SSTs are not working when there is load shedding.	High
Inadequate sludge treatment, because sludge cannot be pumped to Gwaing when there is load shedding.	Medium
Gwaing	
Infrastructure failure on sewer network, at pump stations and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Fats and oils from restaurants interfere with biological processes at WWTW	Medium
Spillages at sewer pump stations, due to electricity failures	Medium
Spillages at sewer pump stations, due to large foreign objects that cause damage to pump impellers.	Medium
Staff working with chlorine requires refresher training in order to ensure that emergency procedures and action plans are followed during an incident.	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place. Current O&M Manuals are outdated.	Medium
Staff health and safety compromised, since occupational health and safety training is lacking	Medium
Non-compliance with final effluent standard due to inadequate plant capacity	Medium
Non-compliance with final effluent standards, because Biological Reactor is not working when there is load shedding.	High
Non-compliance with final effluent standards, because SSTs are not working when there is load shedding.	High
Inadequate sludge treatment, because Belt Presses are not operational when there is load shedding.	Medium
Final effluent not meeting the authorised limits for Fat, Oil and Grease content.	Medium
Kleinkrantz	
Infrastructure failure on sewer network and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Spillages at sewer pump stations, due to electricity failures	Medium
Spillages at sewer pump stations, due to large foreign objects that cause damage to pump impellers.	Medium
Staff working with chlorine not adequately trained and emergency procedures and action plans not in place.	Medium
Inadequate chlorine signage at treatment facilities.	Medium
Building construction, loading and off-loading equipment and chlorine storage facilities not on standard.	Medium
Dosing equipment and safety equipment not on standard.	Medium
Human accidents due to personal protective equipment being insufficient	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place	Medium
Staff health and safety compromised, since occupational health and safety training is lacking	Medium
Non-compliance with final effluent standards, because Biological Reactor is not working when there is load shedding.	High
Non-compliance with final effluent standards, because SSTs are not working when there is load shedding.	High
Herolds Bay	

Table C.4.3.2: Medium and High risks for the various WWTWs and sewer drainage networks	
Identified Hazards / Risks	**Residual Risk**
Infrastructure failure on sewer network, at pump stations and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Spillages at sewer pump stations, due to electricity failures	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place. Current O&M Manuals are outdated.	Medium
Non-compliance with final effluent standard due to inadequate plant capacity (Hydraulic and Organic)	Medium
Groundwater pollution	Medium
Uniondale	
Infrastructure failure on sewer network, at pump stations and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Spillages at sewer pump stations, due to electricity failures	Medium
Spillages at sewer pump stations, due to large foreign objects that cause damage to pump impellers.	Medium
Staff working with chlorine requires refresher training in order to ensure that emergency procedures and action plans are followed during an incident.	Medium
Inadequate chlorine signage at treatment facilities.	Medium
Building construction, loading and off-loading equipment and chlorine storage facilities not on standard.	Medium
Dosing equipment and safety equipment not on standard.	Medium
Human accidents due to personal protective equipment being insufficient	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place. Current O&M Manuals are outdated.	Medium
Staff health and safety compromised, since occupational health and safety training is lacking	Medium
Non-compliance with final effluent standards, because Biological Reactor is not working when there is load shedding.	High
Non-compliance with final effluent standards, because SSTs are not working when there is load shedding.	High
Ponds overgrown with vegetation and not lined, which can lead to erosion of walls	Medium
Haarlem	
Infrastructure failure on sewer network, at one pump station and at WWTW, due to lack of adequate funding to ensure proper maintenance	Medium
Spillages at sewer pump station, due to electricity failures	Medium
Human accidents due to inadequate lighting on site	High
Human accidents due to inadequate security measures on site, such as fencing, hand rails, life buoys and signage	Medium
Staff health and safety compromised, since there are not adequate safety procedures in place. Current O&M Manuals are outdated.	Medium
Non-compliance with final effluent standard due to inadequate plant capacity	Medium
Stolen or vandalised chemicals, because of inadequate chemical storage facilities	Medium
Screenings and grit are not removed before the septic tank	Medium
Non-compliance with final effluent irrigation standards, because Aeration is not working when there is load shedding.	High
Non-compliance with final effluent irrigation standards, because Clarification are not working when there is load shedding.	High

The Water Safety Plan and W2RAP Teams of George Municipality are committed to meet regularly to review the implementation of all the aspects of the Water Safety Plans and W_2RAPs to ensure that they are still accurate and to determine whether the field assessments need updates or modifications and whether the Incident Response Management Protocol is still adequate.

In addition to the regular three-year review, the Water Safety Plan and W_2RAP will also be reviewed when, for example, a new water source is developed, major treatment improvements are planned and brought into use, or after a major incident.

An Incident Response Management Protocol is in place and forms part of George Municipality's Water Safety Plan and W_2RAP. The Incident Response Management Protocol entails that certain reactive procedures are followed when an incident occurs, such as when a malfunction of the treatment processes occurs due to power failures, faulty equipment, adverse weather conditions or human error.

Operational Alert Levels are also in place for the various WTWs and WWTWs in order to ensure that the various unit processes in the plant performs optimally. If these pre-determined Alert Levels are exceeded at any of the control points where samples are taken for operational purposes, specific actions are taken to bring the operational parameters back to within the target ranges.

Operational and Compliance Water Quality and Final Effluent Monitoring Programmes, which meet the legal requirements, are implemented by the Municipality (Included under Section C.4.1).

George Municipality's Maintenance Team mainly performs their own repair and preventative maintenance work to the equipment and infrastructure of the Municipality, except when specialized repair work is required, in which case the work is sub-contracted to approve Contractors on the Municipality's Supplier database.

The graph below gives an overview of the number of pipe bursts reported and repaired over the various financial years. A total of 395 mainline leaks were also repaired during the last financial year, over and above the pipe bursts indicated on the graph below.

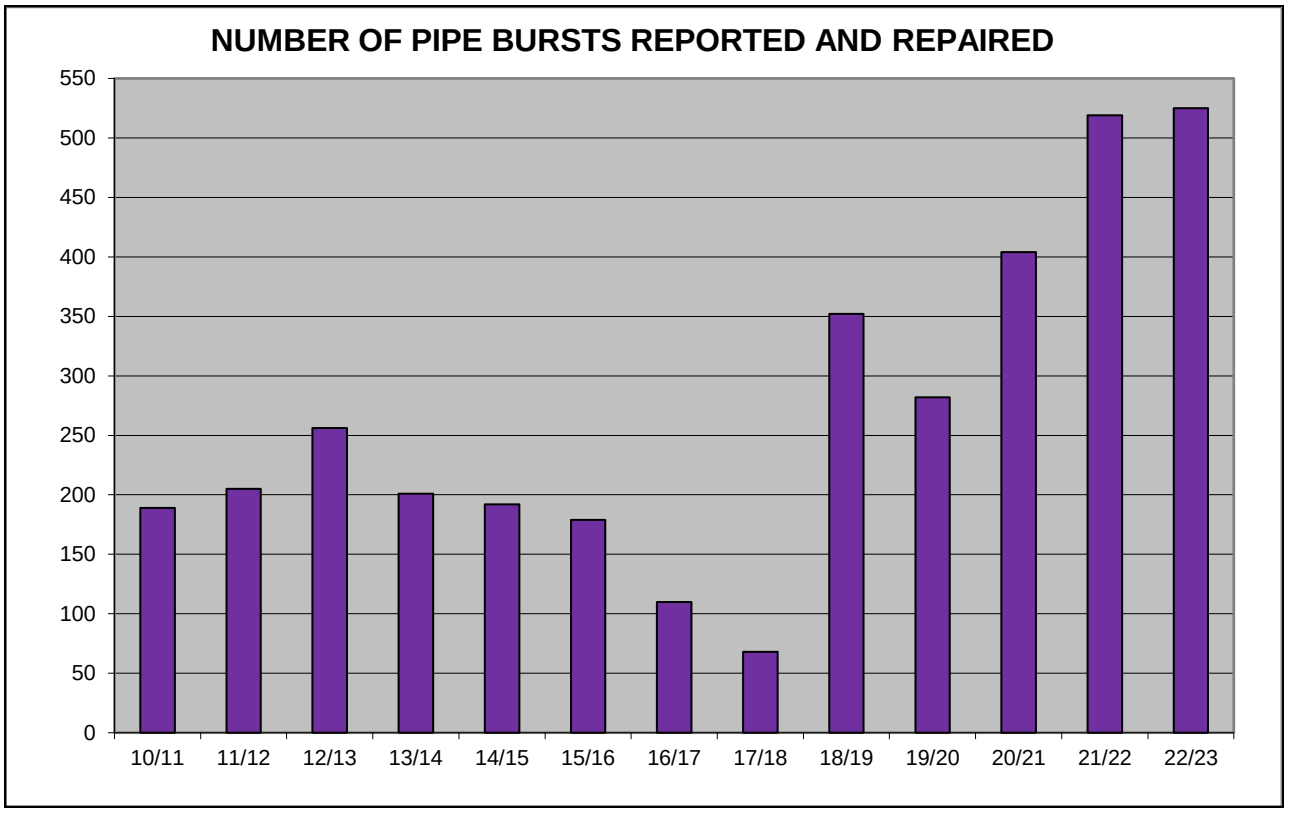


Figure C.4.3.1: Number of pipe bursts reported and repaired by the Municipality

Table C.4.3.3: Incident Management and Reporting Overview

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2022/23	Year - 1 FY2021/22	Year - 2 FY2020/21
6.3	**Water Supply and Quality**				
6.3.1	Incident Management Protocol in place	yes/total schemes in %	100%	100%	100%
6.3.5	Failure Response Management in place	yes/total schemes in %	100%	100%	100%
6.4	**Waste Water Supply and Quality**				
6.4.1	Incident Management Protocol in place	yes/total schemes in %	100%	100%	100%
6.4.5	Failure Response Management in place	yes/total schemes in %	100%	100%	100%

Table C.4.3.4: Water Quality Incident Reporting Compliance (Health Oriented)										
Measurable / Enabling Factor	**Unit**	**Year 0**			**Year-1**			**Year-2**		
		FY2022/23			**FY2021/22**			**FY2020/21**		
		Acute Health Micriobiological	Acute Health Chemical	Chronic Health	Acute Health Micriobiological	Acute Health Chemical	Chronic Health	Acute Health Micriobiological	Acute Health Chemical	Chronic Health
Failures in terms of Analysis	Total nr	571	-	2250	551	16	2260	628	36	2638
	Nr of failures	14	-	6	0	0	0	0	0	2
	Failure %	2.5%	-	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	Nr reported	14	-	6	0	0	0	0	0	2
	Reported % of failure	100.0%	-	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Failures in terms of Samples	Total	571	-	2250	551	16	2260	628	36	2638
	Nr of failures	14	-	6	0	0	0	0	0	2
	Failure %	2.5%	-	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	Nr reported	14	-	6	0	0	0	0	0	2
	Reported % of failure	100.0%	-	100.0%	100.0%	200.0%	100.0%	100.0%	200.0%	100.0%
Failures in terms of Sites	Total	571	-	2250	551	16	2260	628	36	2638
	Nr of failures	14	-	6	0	0	0	0	0	2
	Failure %	2.5%	-	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	Nr reported	14	-	6	0	0	0	0	0	2
	Reported % of failure	100.0%	-	100.0%	100.0%	200.0%	100.0%	100.0%	200.0%	100.0%

Note: Water quality compliance sample results are included in Annexure D

C.5. Water Conservation and Water Demand Management

The table below gives an overview of the WC/WDM activities implemented by George Municipality.

Table C.5.1: Overview of WC/WDM Activities

WSDP Ref. #	Regulations Ref. #	Description	Urban Settlements						Rural Settlements					
			Year 0		Year - 1		Year - 2		Year 0		Year - 1		Year - 2	
			2022/23		2021/22		2020/21		2022/23		2021/22		2020/21	
7.1.1	10.2.g.iii	**REDUCING UNACCOUNTED FOR WATER AND WATER INEFFICIENCIES**												
		Number of customers where the following activities have been pursued:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.1.1		Night flow metering	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.1.2		Day flow metering	48 265	100%	45 685	100%	44 797	100%	0	0%	0	0%	0	0%
7.1.1.3		Reticulation leaks fixed (Pipe bursts)	525	100%	519	100%	404	100%	0	0%	0	0%	0	0%
7.1.1.4		Illegal connections formalized	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.1.5		Un-metered connections, metered	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.2	10.2.g.iii	**REDUCING HIGH PRESSURES FOR RESIDENTIAL CONSUMERS**												
		Number of residential consumers with water supply pressure of:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.2.1		< 300 kPa	5 792	12%	5 482	12%	5 376	12%	0	0%	0	0%	0	0%
7.1.2.2		300 kPa - 600 kPa	20 754	43%	19 645	43%	19 263	43%	0	0%	0	0%	0	0%
7.1.2.3		600 kPa - 900 kPa	17 375	36%	16 447	36%	16 127	36%	0	0%	0	0%	0	0%
7.1.2.4	10.2.b.iii	> 900 kPa	4 344	9%	4 112	9%	4 032	9%	0	0%	0	0%	0	0%
7.1.3	10.2.g.iii	**LEAK AND METER REPAIR PROGRAMMES**												
		Number of consumer units targeted by:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.3.1		Leak repair assistance programme	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.3.2	10.2.g.iv	Retro-fitting of water inefficient toilets	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.3.3		Meter repair programme	1 805	4%	1 486	3%	1 165	3%	0	0%	0	0%	0	0%
7.1.4	10.2.g.iii	**CONSUMER / END-USE DEMAND MANAGEMENT: PUBLIC INFO AND EDUCATION PROGRAMMES**												
			Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.4.1		Number of schools targeted by education programmes	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.4.2		Number of consumers (people) targeted by public information programmes	48 265	100%	45 685	100%	44 797	100%	0	0%	0	0%	0	0%

The implementation of George Municipality's WDM Strategy assisted to reduce the overall water requirements of the towns significantly. The overall percentage of NRW was 30.15% (System Input – Revenue Water) and the percentage of Water losses was 18.56% (System Input – Authorised Consumption) for the 2022/2023 financial year. The graph below gives an overview of the annual system input volume and NRW for the various distribution systems in George Municipality's Management Area.

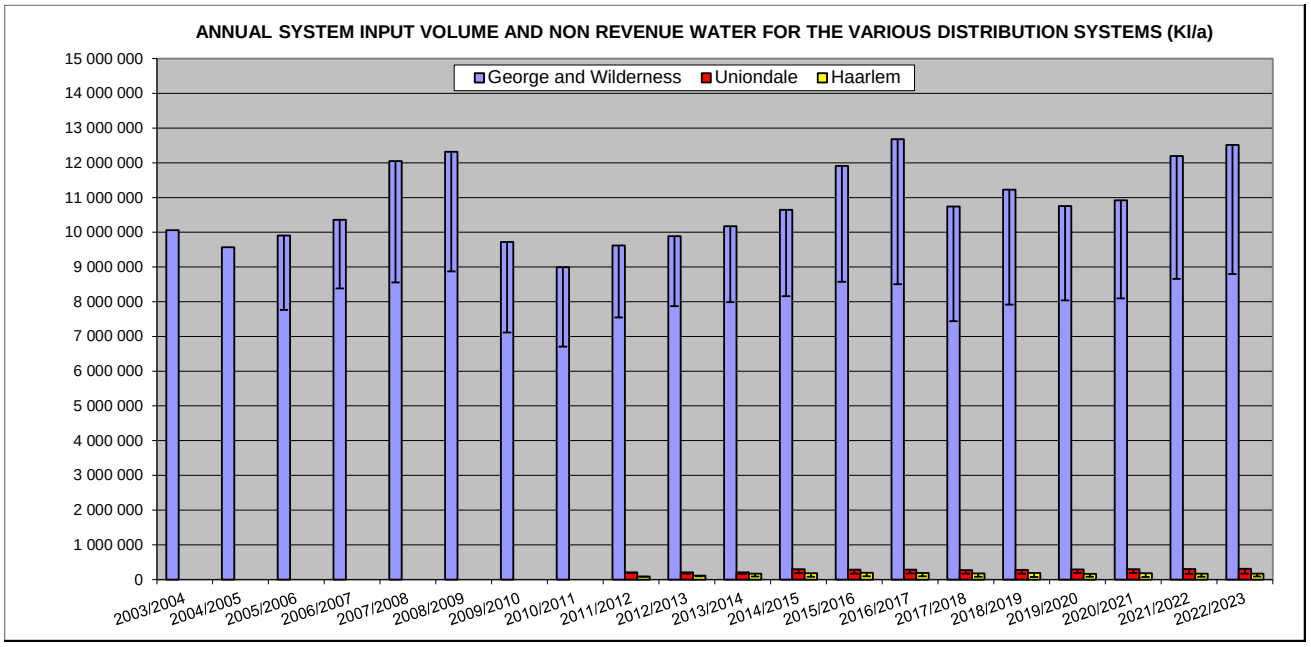


Figure C.5.1: System Input Volume and NRW for the George/Wilderness, Uniondale and Haarlem systems.

The historical annual water treatment losses, NRW and water losses for the George/Wilderness distribution system are summarised in the graph below.

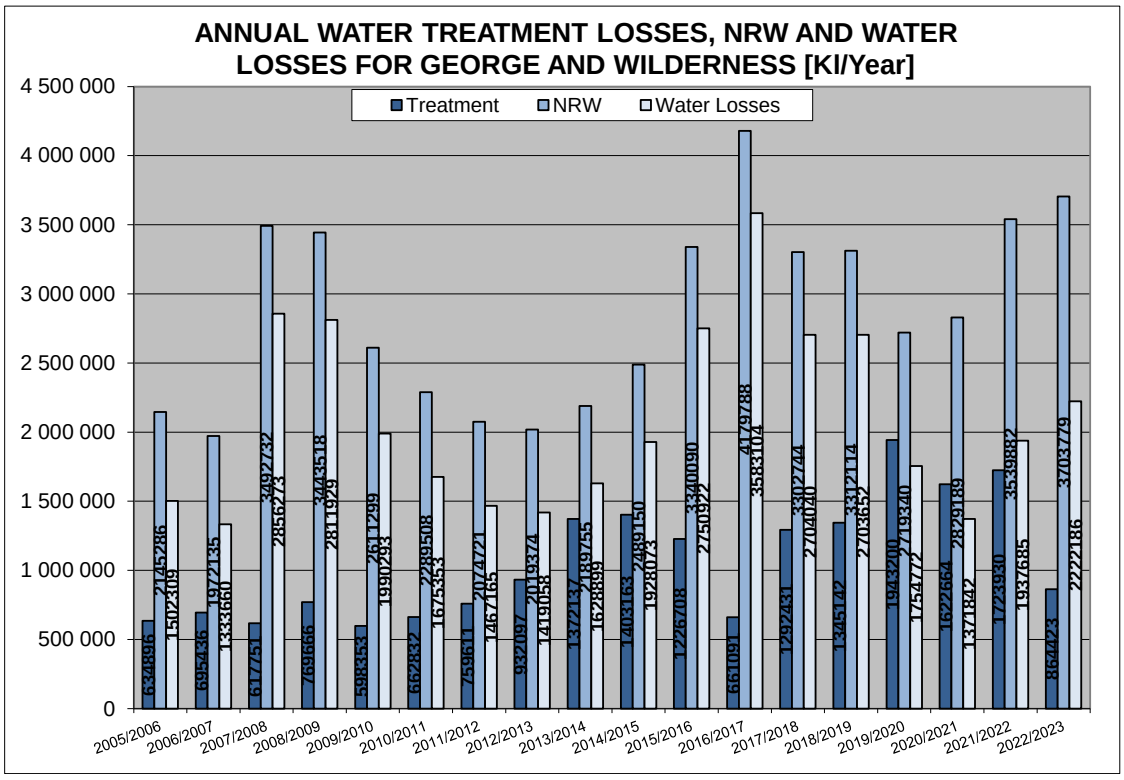


Figure C.5.2: Annual treatment losses, NRW and water losses for the George/Wilderness system.

The existing WDM Strategy will enable the Municipality to meet the challenge of the growing water requirements on the raw water resources and to ensure that growth and development remains sustainable in the George Municipality's Management Area.

The vision of George Municipality's WDM Strategy is as follows:

"George Municipality commits itself, within reason and as far as practically possible, to uphold and continually impose the WDM measures currently in place and to impose new measures where WDM can be further improved"

Quantity of water unaccounted for (Ml/year):

The table below gives a summary of the treatment losses, NRW, water losses and ILIs for the various water distribution systems in George Municipality's Management Area.

Table C.5.2: Treatment Losses, NRW, Water Losses and ILIs for the various water distribution systems

Description	Component	Unit	22/23	Record: Prior (Ml/a)			
				21/22	20/21	19/20	18/19
George / Wilderness	Treatment Losses	Volume	864.423	1 723.930	1 622.664	1 943.200	1 345.142
		Percentage	6.46%	12.39%	12.93%	15.30%	10.70%
	NRW	Volume	3 703.779	3 539.882	2 829.189	2 719.340	3 312.114
		Percentage	29.59%	29.03%	25.90%	25.28%	29.50%
	Water Losses	Volume	2 222.186	1 937.685	1 371.842	1 754.772	2 703.652
		Percentage	17.75%	15.89%	12.56%	16.31%	24.08%
	ILI		**2.27**	**2.01**	**1.43**	**1.86**	**2.87**
	The Municipality can work towards a target of 10% for the treatment losses. The NRW and Water Losses increased slightly during the last financial year. The Municipality needs to work towards a target of 25% for the NRW. The billed unmetered connections need to be phased out (flat rates), in order to further reduce the NRW. The unbilled unmetered consumption also needs to be addressed (Unmetered informal connections and built erven with zero consumption). The ILI of 2.27 indicates a good management system with no urgent action, but NRW and Water Losses need to be monitored carefully. The Municipality needs to keep the ILI level between 1 and 2.						
Uniondale	Treatment Losses	Volume	-34.490	-5.379	11.148	12.498	15.054
		Percentage	-12.55%	-1.80%	3.61%	4.12%	5.14%
	NRW	Volume	134.693	139.876	109.072	99.189	107.445
		Percentage	43.54%	45.97%	36.69%	34.11%	38.66%
	Water Losses	Volume	121.510	127.243	95.769	92.632	100.553
		Percentage	39.28%	41.82%	32.21%	31.86%	36.18%
	ILI		**9.53**	**10.36**	**7.67**	**7.43**	**8.08**
	The treatment losses are negative and the reason for that needs to be investigated. The NRW and Water Losses were reduced during the last financial year, but are still very high. The Municipality needs to work towards a target of 35% for the NRW and 30% for the Water Losses, where after it can be further reduced. The ILI of 9.53 indicates a very bad management system, which requires immediate water loss reduction interventions.						
Haarlem	Treatment Losses	Volume	13.978	27.829	15.318	15.340	7.545
		Percentage	7.62%	14.09%	7.77%	8.45%	3.87%
	NRW	Volume	79.295	92.225	105.529	83.722	110.344
		Percentage	46.78%	54.34%	58.07%	50.38%	58.91%
	Water Losses	Volume	68.480	80.258	95.662	79.214	104.353
		Percentage	40.40%	47.29%	52.64%	47.66%	55.71%
	ILI		**6.30**	**7.46**	**8.77**	**7.28**	**9.49**
	The treatment losses are at acceptable levels and should be kept below 10%. The NRW and Water Losses were reduced during the last financial year, but are still high. The Municipality needs to work towards a target of 35% for the NRW and 30% for the Water Losses, where after it can be further reduced. The ILI of 6.30 indicates a poor management system, which requires attention.						
TOTAL	**Treatment Losses**	**Volume**	**843.911**	**1 746.380**	**1 649.130**	**1 971.038**	**1 367.741**
		Percentage	**6.10%**	**12.12%**	**12.64%**	**14.95%**	**10.47%**
	NRW	**Volume**	**3 917.767**	**3 771.983**	**3 043.790**	**2 902.251**	**3 529.903**
		Percentage	**30.15%**	**29.77%**	**26.69%**	**25.88%**	**30.19%**
	Water Losses	**Volume**	**2 412.176**	**2 145.186**	**1 563.273**	**1 926.618**	**2 908.558**
		Percentage	**18.56%**	**16.93%**	**13.71%**	**17.18%**	**24.88%**

Table C.5.2: Treatment Losses, NRW, Water Losses and ILIs for the various water distribution systems	
	The treatment losses are at acceptable levels and should be kept below 10%. The overall NRW needs to be kept below a target of 25% and the Water Losses below a target of 15%. The billed unmetered connections need to be phased out (flat rates) for all the systems, in order to further reduce the NRW. The unbilled unmetered consumption also needs to be addressed (Unmetered informal connections and built erven with zero consumption).

Note: Infrastructure Leakage Index (ILI) for Developed Countries = **1 – 2 Excellent (Category A)**, **2 – 4 Good (Category B)**, **4 – 8 Poor (Category C)** and > **8 – Very Bad (Category D)**

Category A = No specific intervention required.

Category B = No urgent action required although should be monitored carefully.

Category C = Requires attention

Category D = Requires immediate water loss reduction interventions

The Infrastructure Leakage Index (ILI) in the above table is the most recent and preferred performance indicator for comparing leakage from one system to another. It is a non-dimensional index representing the ratio of the current real leakage and the "Unavoidable Annual Real Losses". A high ILI value indicates a poor performance with large potential for improvement while a small ILI value indicates a well-managed system with less scope for improvement. The parameters used to calculate the ILIs for the various distribution systems are included in the Models in Annexure B. Attaining and ILI = 1 is a theoretical limit, which is the minimum water loss in an operational water reticulation system. A value of less than 1 should not occur since this implies that the actual leakage is less than the theoretical minimum level of leakage.

The table below gives an overview of the System Input Volume, Average Billed Metered Consumption and Non-Revenue Water in litre per connection per day for the various water distribution systems for the 2022/2023 financial year.

Table C.5.3: System input volume, average billed metered consumption and non-revenue water in litre per connection per day for the various water distribution systems for 2022/2023.			
Water Balance Component	**George and Wilderness**	**Haarlem**	**Uniondale**
System Input Volume	895	900	773
Average Billed Metered Cons.	603	472	431
Non-Revenue Water	265	428	341

Haarlem is the town with the highest system input volume and non-revenue water per connection per day. The George/Wilderness system is the system with the highest average billed metered consumption per connection per day.

Number of consumers connected to a water reticulation system where pressures rise above 900 kPa at the consumer connection are as follows:

The table below gives a summary of the water pressures experienced by the consumers connected to various water distribution systems, as taken from the Water Master Plans.

Table C.5.4: Static pressure experienced by consumers for the various distribution systems			
Static Pressure at consumer connection points (m)	**Number of Erven**		
	George	**Uniondale**	**Haarlem**
0 - 30	5 138	192	127
30 - 60	18 798	836	411
60 – 90	16 558	0	97
90 – 120	4 011	0	0
> 120	245	0	0
Total	**44 750**	**1 028**	**635**

The updated Water Master Plans will be consulted in conjunction with the WDM Strategy to identify further areas where pressure reduction can be implemented. Possible measures to reduce the static pressure were considered in the Water Master Planning process.

The table below gives an overview of the length of water pipelines and the average dynamic and static head for the different water distribution zones (June 2023).

Tables C.5.5: Length and average head of water pipelines			
Zone	**Length (km)**	**Average Dynamic Head**	**Average Static Head**
Raw Water Pipelines			
Boreholes *	0.863	109.13	91.66
Boreholes (future) *	0.015	0.14	92.43
Ebb and Flow (raw water) *	3.811	21.69	22.22
Garden Route Dam (raw water) *	10.836	52.27	47.39
Garden Route Dam (raw water)-Garden Route Dam Booster *	1.083	41.07	41.07
Haarlem (raw water) *	0.011	1.87	28.87
Haarlem Irrigation Dam (raw water) *	4.012	8.81	32.73
Kaaimans River (raw water) *	2.084	45.75	50.04
Malgas River (raw water) *	7.418	28.40	46.91
Outeniqua (raw water) *	8.117	10.97	25.82
Swart River Dam (raw water) *	0.005	34.00	34.00
Uniondale (raw water) *	3.106	5.75	11.32
Bulk Water Pipelines			
Avontuur-Avontuur Filter	-	33.26	55.56
Ebb and Flow (clear water) *	0.053	9.91	10.00
George-Blanco Main	2.996	15.57	17.76
George-George Main-George Sub	219.850	43.55	50.14
George-Wilderness Main-Ebb and Flow Res	36.781	58.22	65.19
Haarlem-Haarlem WTP *	0.293	28.30	33.65
Haarlem-Haarlem WTP-Haarlem HL Res	7.732	38.05	35.59
New WTP (clear water) *	1.588	23.61	28.70
Old WTP (clear water)	0.269	8.67	8.43
Uniondale-Uniondale WTP	2.805	51.11	116.05
Reticulation Pipelines			
Avontuur-Avontuur Borehole-Avontuur Site B Res	0.271	6.05	7.05
Avontuur-Avontuur Filter-Avontuur PS-Avontuur Site A Res-Avontuur School Booster	0.096	9.56	10.13
George-Blanco Main-Blanco/Heatherlands-Blanco/Heatherlands PRV	16.178	34.72	55.28
George-Blanco Main-Blanco/Heatherlands-Die Rus Booster	0.908	45.77	43.22
George-Blanco Main-Blanco/Heatherlands-Kingswood PRV	10.789	38.53	43.86
George-Blanco Main-Blanco/Heatherlands-Modrivier	8.649	42.91	76.43
George-Blanco Main-Fancourt Tanks-Golden Valley Res-Golden Valley M19	4.667	45.82	44.02
George-Blanco Main-Fancourt Tanks-Golden Valley Res-Golden Valley M20	6.570	50.37	48.39
George-Blanco Main-Palotti	12.113	34.50	44.71
George-George Main-George RCBLPP-Borcherds-Borcherds PRV	9.046	45.53	47.42
George-George Main-George RCBLPP-Conville	8.089	52.93	86.08
George-George Main-George RCBLPP-Lawaaikamp	4.942	37.47	90.32
George-George Main-George RCBLPP-Parkdene	20.919	39.33	90.48
George-George Main-George RCBLPP-Protea Park	3.928	78.64	80.57
George-George Main-George RCBLPP-Rosemoor 1	4.948	56.00	76.64
George-George Main-George RCBLPP-Rosemoor 2	13.280	60.79	82.26
George-George Main-George Sub-Blue Mountain	13.112	85.26	87.21
George-George Main-George Sub-Glen Haven PRV	0.558	54.20	54.22
George-George Main-George Sub-Kraaibosch Estate PRV1	5.687	49.45	50.27
George-George Main-George Sub-Kraaibosch Estate PRV2	3.417	51.71	52.03
George-George Main-George Sub-Kraaibosch PRV	9.267	39.70	40.71
George-George Main-George Sub-Steinhoff Ind Park PRV	3.084	58.46	58.59
George-George Main-Kraaibosch-Akela Res	0.000	11.44	81.79
George-George Main-Pacaltsdorp-Pacaltsdorp Erf 325	0.005	81.17	94.85
George-George Main-Thembalethu-Thembalethu PRV2	20.132	35.30	39.84
George-George Main-Thembalethu-Thembalethu PRV3	10.786	37.98	45.86

Tables C.5.5: Length and average head of water pipelines			
Zone	**Length (km)**	**Average Dynamic Head**	**Average Static Head**
George-Herold's Bay Main-Herold's Bay Res-Herold's Bay BPT1	3.370	61.80	62.76
George-Herold's Bay Main-Herold's Bay Res-Herold's Bay BPT1-Herold's Bay BPT2	0.000	-	-
George-Herold's Bay Main-Herold's Bay Res-Herold's Bay BPT1-Herold's Bay BPT3	2.536	39.54	45.24
George-Herold's Bay Main-Oubaai Res-Breakwater Bay	2.537	63.13	74.96
George-Herold's Bay Main-Oubaai Res-Breakwater Bay-Breakwater Bay PRV1	1.039	48.55	48.57
George-Herold's Bay Main-Oubaai Res-Breakwater Bay-Breakwater Bay PRV2	0.887	54.84	54.91
George-Herold's Bay Main-Oubaai Res-Breakwater Bay-Breakwater Bay PRV3	0.768	57.75	57.81
George-Herold's Bay Main-Oubaai Res-Oubaai	10.623	38.60	62.48
George-Herold's Bay Main-Oubaai Res-Oubaai-Oubaai PRV	0.179	52.12	66.83
George-Kraaibosch Main-Kraaibosch Res-Kraaibosch Tower-Welgelegen	3.413	40.72	46.77
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower-Delville Park	11.406	24.46	35.75
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower-Le Grand Res-Le Grand Booster-Le Grand PRV	0.446	47.89	47.92
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu M22	2.805	18.29	23.15
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu M23	3.667	25.25	37.71
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu M24	2.477	19.99	27.96
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu M25	17.739	26.31	38.04
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu MX	1.568	22.41	27.00
George-Wilderness Main-Ebb and Flow Res-Anchorlane	0.858	75.20	89.80
George-Wilderness Main-Ebb and Flow Res-Touwsranten Res-Hoekwil BPT	0.283	14.84	14.86
DBM			
Avontuur-Avontuur Filter-Avontuur PS Sump	0.005	1.59	1.05
Avontuur-Avontuur Filter-Avontuur PS-Avontuur Site A Res	23.512	37.02	61.12
George-Blanco Main-Blanco Tanks	0.075	8.67	6.00
George-Blanco Main-Blanco/Heatherlands	64.137	37.06	68.61
George-Blanco Main-Fancourt Tanks	24.400	31.71	34.78
George-Blanco Main-Fancourt Tanks-Golden Valley Res	1.450	26.15	23.11
George-Blanco Main-Fancourt Tanks-Golden Valley Res-Golden Valley Booster	2.660	64.64	42.03
George-Blanco Main-Saasveld Res	5.500	29.26	30.74
George-George Main-George Sub-Pacaltsdorp Ind	3.952	82.75	92.64
George-George Main-Herold's Bay	10.478	45.19	108.47
George-George Main-Kraaibosch	7.537	90.20	124.19
George-George Main-Pacaltsdorp	2.813	84.64	97.32
George-George Main-Thembalethu	7.356	74.06	96.75
George-George Main-Thembalethu-Thembalethu PRV1	0.036	21.31	25.00
George-Herold's Bay Main-Herold's Bay Res	4.631	26.28	25.89
George-Herold's Bay Main-Oubaai Res	3.659	26.85	27.77
George-Kraaibosch Main-Kraaibosch Res	0.054	5.98	4.95
George-Kraaibosch Main-Kraaibosch Res-Kraaibosch Tower	7.270	32.44	36.13
George-Pacaltsdorp Main-Pacaltsdorp Res	0.064	12.56	9.00
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower	54.016	26.94	36.37
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower-Hansmoeskraal	11.274	36.90	59.07
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower-Le Grand Res	0.038	3.42	2.10
George-Pacaltsdorp Main-Pacaltsdorp Res-Pacaltsdorp Tower-Le Grand Res-Le Grand Booster	3.855	51.49	44.16
George-Thembalethu Main-Thembalethu Res	0.039	13.71	10.24
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower	0.174	24.96	27.70
George-Thembalethu Main-Thembalethu Res-Thembalethu Tower-Thembalethu M11	30.611	33.59	45.04
George-Wilderness Main-Akela Res	9.091	63.47	121.70
George-Wilderness Main-Ebb and Flow Res-Kleinkrantz Res	7.280	12.78	12.75
George-Wilderness Main-Ebb and Flow Res-Touwsranten Res	35.566	59.28	70.56
George-Wilderness Main-Victoria Bay Res	0.800	23.57	24.64
George-Wilderness Main-Wilderness Res	2.999	31.60	29.79
George-Wilderness Main-Wilderness Res-Konstantiakloof Res	2.567	48.03	61.48

Tables C.5.5: Length and average head of water pipelines			
Zone	**Length (km)**	**Average Dynamic Head**	**Average Static Head**
George-Wilderness Main-Wilderness Res-Liebestraum Res	35.468	60.57	68.05
Haarlem-Haarlem WTP-Haarlem HL Res-Haarlem LCH Res	2.388	25.92	25.26
Haarlem-Haarlem WTP-Haarlem HL Res-Haarlem LL Res	17.062	30.05	27.96
Uniondale-Uniondale WTP-Uniondale Site A Res	2.616	19.23	18.00
Uniondale-Uniondale WTP-Uniondale Site B Res	10.920	22.58	21.69
Uniondale-Uniondale WTP-Uniondale Site C Res	6.459	20.91	20.88
Uniondale-Uniondale WTP-Uniondale Site C Res-Uniondale Site D Res	6.622	22.30	24.70

Note: * From June 2021 Water Master Plan

Demand management activities undertaken:

The existing water demand management measures and the future water demand management measures planned by George Municipality, as included in the current WDM Strategy, are summarised in the table below:

Table C.5.6: Existing and future WDM measures included in George Municipality's WDM Strategy	
Existing WDM Measures	**Future WDM Measures**
• Water Master Plan updated quarterly • Block Tariffs • Pipe replacement and maintenance programme • Complaints system • Standby teams for immediate repair of burst pipes • Pressure management • Working for Water • Promoting use of water efficient fittings. • Public Awareness • Zone metering • Telemetry System • Installation of bulk meters in existing areas for monitoring. • Accurate records of water use and losses • Promote rain water harvesting • Promote indigenous gardens • Water restrictions • Strict municipal services standards for the installation of new water reticulation for own and private developments. • Reticulation material and quality standards – Facilitate maintenance. • Up to date WSDP • All large development applications need to be supported with evidence of WDM interventions. • All new medium and large developments to have detailed WDM Plan.	• Pressure Management Pressure management will be introduced, where required, by installing pressure reducing valves with constant downstream pressures. Pressure reduction will be implemented in order to lower pressures to the minimum required pressures during peak times. The number of pressure reducing valves to be installed will be determined on approval of civil engineering plans. This will have the effect of reducing the pressure of the water supply to the new residential erven created. The pressure reducing measures will result in fewer leaks and reduced water consumption due a reduction in wastage. • Metering Individual water meters will be installed for each dwelling. The meters will be maintained by the Municipality and will be read monthly. The Municipality's block tariff system will be applicable to all developments. • Residential measures – Water efficient fittings The following conditions will be included in the Deed of sales of erven: ➢ Install low flow shower heads. ➢ Install dual flush low flow toilet cisterns. ➢ Any other measures specified by the George Municipality The following will be compulsory for erf owners for implementation during the planning and building of private residences: ➢ Design a 5 000 ℓ rainwater tank as part of the house layout and install a small automatic pressure pump, where necessary, for use for irrigation and other purposes. • Leakage Control Combination bulk water meters will be installed, as required (one on each connector pipe to the residential development). The meters will be connected to the existing Municipal telemetry system for continuous monitoring. Night flows will thus be monitored so that pipe bursts and leaks can be identified immediately. During the construction process strict monitoring of construction methods and pipe laying will be maintained by the consultants to ensure that the quality of the pipe network system is of a high standard. The latter will reduce leakages and breakages which could occur in future if pipelines and fittings are incorrectly installed. • User Education The home owner's association/body corporate will educate the residents by placing notices at the entrance gate, administration office, or any other publicly accessible area which will include water saving recommendations (Bathrooms, Kitchens, Laundries and Outside areas). • Indigenous Gardens Indigenous gardens and smaller planted areas that need irrigating will be promoted for all dwellings and will be implemented in the developments private/public open spaces. Re-use of grey water

Table C.5.6: Existing and future WDM measures included in George Municipality's WDM Strategy	
Existing WDM Measures	**Future WDM Measures**
	In accordance with the George Municipality's approach, grey water re-use on site will not be promoted. The main reason being that it is envisaged to treat all waste water at a central treatment plant where the water will be treated to potable standards for re-use under controlled conditions.

DWS's scorecard for assessing the potential for WC/WDM efforts, as completed for George Municipality, is included in Annexure B. The aim of the scorecard was to establish areas where the municipality has made good progress in relation to WC/WDM and where there is still room for improvement. It can be seen from the Scorecard that there are 25 questions each of which carries a maximum of 4 points providing a possible maximum score of 100. If the Municipality has the specific item completely under control, it receives the maximum points and if it is neglecting the item completely it receives no points. There are various levels between the maximum and the minimum number of points assigned to the municipality for each item depending on the level of completeness or lack thereof. **The status quo score for George Municipality is 78 out of 100 suggesting that the Municipality is making good progress with regard to the implementation of specific WC/WDM activities.**

A pipeline replacement study was performed by GLS for George Municipality's entire water and sewer distribution systems, during 2021/2022. The project entailed the verification of system data, establishment of a computer model for the pipe replacement network, performing an analysis and reporting. The pipe replacement potential was determined for each of the pipelines in the water and sewer distribution systems by assessing the likelihood of failure (LF) and the consequence of failure (CF).

The table below gives an overview of the top five bulk pipeline and top ten reticulation networks water pipeline replacement priorities.

Table C.5.7: Top five bulk water pipeline and top ten water reticulation networks PRP projects				
PRP Description	**Phasing**	**Action Required**	**Total Pipe Length (m)**	**Total Cost**
Water Bulk Pipelines				
Airport bulk supply	1	PRP & MP	11 614	R18 527 000
George bulk supply	3	PRP	6 302	R9 682 000
Kraaibosch bulk supply	3	PRP & MP	5 886	R4 274 000
Touwsranten bulk supply	2	PRP & MP	4 230	R5 313 000
Thembalethu bulk supply	1	PRP	2 816	R14 427 000
Total			**30 848**	**R52 223 000**
Water Reticulation Networks				
Parkdene reticulation	2	PRP & MP	5 459	R14 541 000
Fancourt Gardens reticulation	1	PRP	1 456	R3 966 000
CPA area reticulation	2	PRP	1 398	R17 198 000
Conville reticulation	5	PRP	7 844	R12 467 000
Seaview reticulation	4	PRP	5 323	R11 962 000
Riverlea reticulation	5	PRP	5 421	R12 486 000
Zone 2 reticulation	3	PRP & MP	4 257	R22 683 000
Protea Estate reticulation	4	PRP & MP	6 137	R7 583 000
Bergsig reticulation	5	PRP	4 543	R9 157 000
Ballotsview reticulation	4	PRP	12 136	R17 376 000
Total			**53 974**	**R129 419 000**

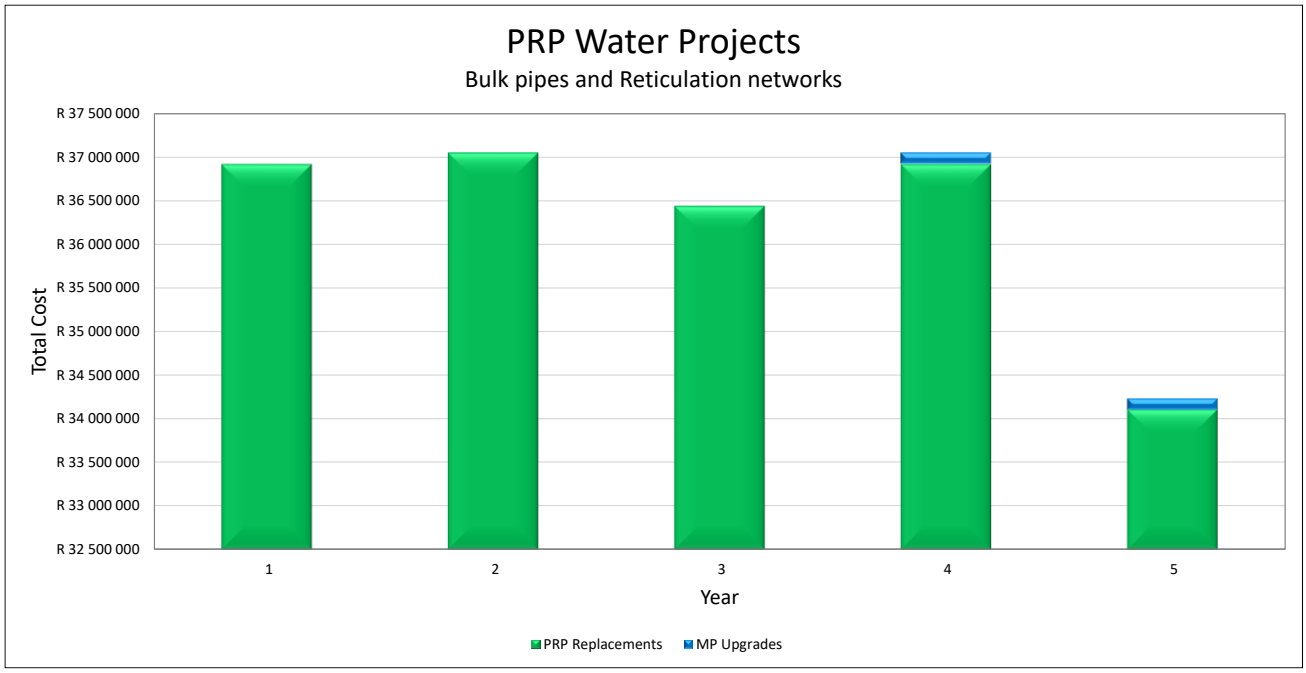


Figure C.5.3: Bulk and reticulation networks water PRP projects

The table below gives an overview of the top five bulk pipeline and top ten reticulation networks sewer pipeline replacement priorities.

Table C.5.8: Top five bulk sewer pipeline and top ten sewer reticulation networks PRP projects

PRP Description	Phasing	Action Required	Total Pipe Length (m)	Total Cost
Sewer Bulk Pipelines				
Kleinkrantz PS rising main	5	PRP & MP	1 826	R6 437 000
Riverlea outfall sewer	2	PRP & MP	8 267	R28 998 000
Meul PS outfall sewer	3	PRP & MP	2 292	R5 041 000
Fernridge outfall sewer	1	PRP	1 917	R20 211 000
Meul PS rising main	5	PRP & MP	2 049	R4 501 000
Total			**16 351**	**R65 188 000**
Sewer Reticulation Networks				
Parkdene reticulation	1	PRP & MP	5 379	R17 858 000
Harmony Park reticulation	2	PRP	2 133	R7 083 000
Borcherds reticulation	4	PRP	7 438	R24 695 000
Urbansville reticulation	4	PRP	2 301	R7 622 000
Seaview reticulation	5	PRP	8 625	R28 066 000
Conville reticulation	3	PRP	6 253	R20 759 000
Zone 2 reticulation	4	PRP	2 089	R6 935 000
Herolds Bay reticulation	2	PRP	907	R3 012 000
Convent Gardens reticulation	3	PRP & MP	2 776	R9 216 000
Zone 8 reticulation	3	PRP	1 239	R4 116 000
Total			**39 140**	**R129 362 000**

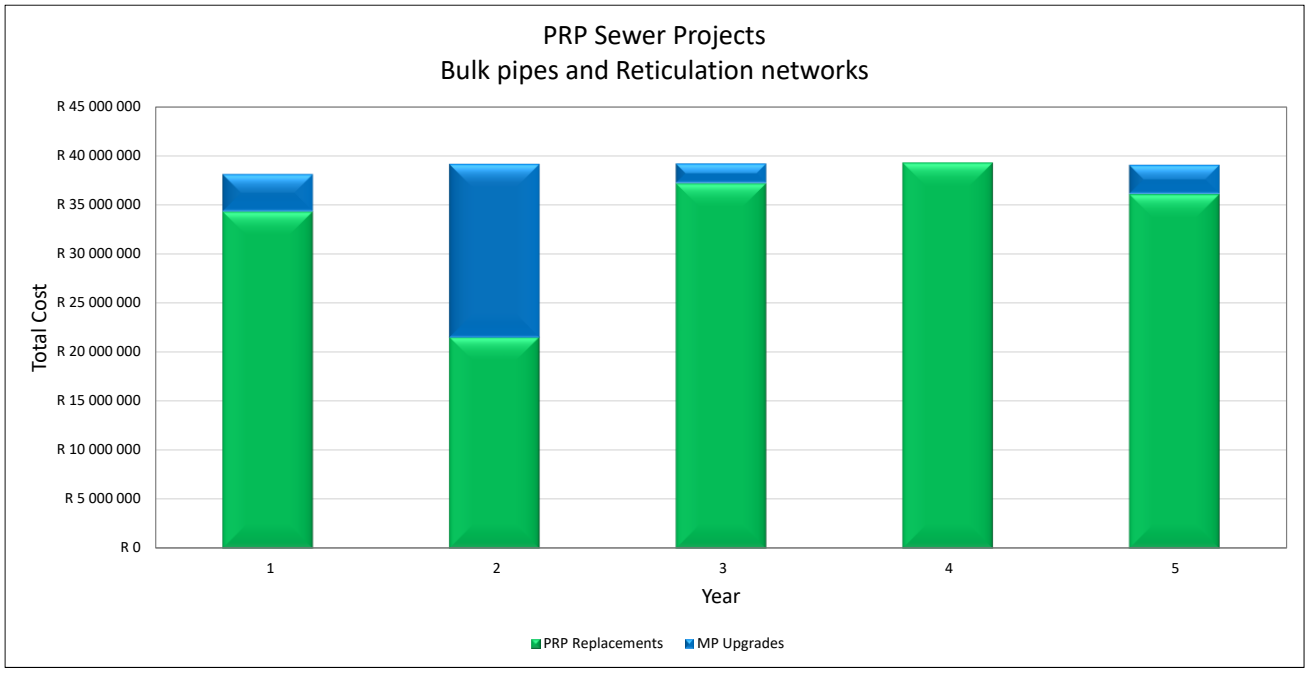


Figure C.5.4: Bulk and reticulation networks sewer PRP projects

The pipeline replacement models will greatly assist the pipe replacement prioritization process as it is completely based on a new scientific approach. By allocating funds to prioritizing those pipes most likely to fail in future, a limited budget can be spent effectively.

The location of pipe failures should in future be recorded preferable with accurate GPS coordinates or directly linked to specific assets. This would enhance the quality of the output of this pipe failure model. It is recommended that this model be used as a primary tool to identify pipes for inspection before replacement and as a secondary tool to replace pipes directly.

George Municipality's June 2023 "Swift data" indicated the following Billed-, Flat Rate-, No Consumption- and Informal connection counts for the three systems.

Table C.5.9: Billed-, flat rate-, no consumption and informal connection count (June 2023)

System	Billed	Flat Rate	No Consumption	Informal (Land Use)
George/Wilderness	38 649	2 118	3 224	12 170
Uniondale	1 072	11	59	27
Haarlem	503	7	55	8
Total	**40 224**	**2 136**	**3 338**	**12 205**

The following actions need to be taken by George Municipality with regard to the above information.

- All unmetered erven (Flat rates) to be phased out. Meters to be installed at all unmetered built erven.
- All erven supplied with meters, but with "no consumption" need to be inspected and new water meters need to be installed at the erven where the meters are found to be not working or where illegal connections were made.
- All erven with consumption less than 0.1 kl/d to be inspected in order to ensure that the meters are working and registering accurately.
- All water connection points in informal areas to be supplied with water meters, which need to be read monthly to form part of the billed metered consumption.

George Municipality also determine the large water users through their Water Master Planning process. The table below gives an overview of the large water users in George Municipality for the last four financial years (AADD > 20 kl/d).

Table C.5.10: Large water users for the last four financial years (AADD > 20 kl/d)

Consumer	Address	Suburb Category	AADD (Kl/d)			
			2020	2021	2022	2023
Lancewood Holdings	Ruby Crescent 11	Rural Areas	860	823	881	<20
Republic of South Africa	Union Street	George Industrial	281	276	334	310
Oubaai Home Owners Association	Herolds Bay 406	Oubaai Golf Estate	284	229	350	420
George Municipality	York Street	Sport Park	170	166	175	<20
PG Bison Southern Cape (Pty) Ltd	P W Botha Boulevard	Steinhoff Industrial Park	99	111	115	110
Attacq Retail Fund Pty Ltd	Farms	Garden Route Mall	207	101	<20	100
Nelson Mandela University (NMMU)	Farms	Saasveld	103	101	104	155
Nuwe Rioolplaas	Vaalkom Street	Herolds Bay	64	80	66	40
George Municipality	Joseph Crescent	Oudorp	65	65	65	<20
George Municipality	National Road Wilderness	Wilderness	79	63	63	62
Mediclinic Properties (Pty) Ltd	Gloucester Lane	Central Business District	59	60	63	<20
Mun George (Tourist Office)	Sandkraal Road	Zone 1	58	59	70	<20
Die Voorsitter	Jonas Street	Riverlea	42	53	37	<20
Tradelink Dyeing Co. (Pty) Ltd	Industrial Street	George Industrial	109	51	90	69
Stanmar Motors (Pty) Ltd	Pioneer Road	Pacaltsdorp Industria	25	49	25	<20
Roelcor Malmesbury (Pty) Ltd	Rand Street	George Industrial	42	49	40	38
George Hospital - Parking	Davidson Road 106	Heatherlands	60	46	45	61
Mr/Ms Van Rensburg Boerdery	Farms	Rural Areas	88	44	<20	<20
Distrik Padingeneur Provinsie	York Street	CPA Area	< 20	42	53	25
High Technical School Eden	Union Street	George Industrial	45	41	48	<20
Tuiniqua Centrum	Church Street: George	Bodorp	52	41	44	33
Dept. Public Works	Voortrekker Street	Uniondale (Area 1)	44	39	<20	<20
Rosemore Dienssentrum Vir Bejaardes	Attakwa Street	Rosemoore	41	38	43	48
Harry Comay Santa Center	Sandkraal Road	Conville	34	37	<20	32
SS Meade Gardens	Laing Street	George South	43	36	36	38
Lucky Streak Pty Ltd	Pioneer Road	Pacaltsdorp Industria	< 20	< 20	36	34
Department Health (Thembalethu Clinic)	Ngcakani Road	Zone 2	23	35	23	<20
Accelerate Prop Fund Ltd	Blue Mountain	Garden Route East	46	35	50	40
SS Bergville	Eight Avenue	Denneoord	32	35	36	31
MTO Forestry (Pty) Ltd	Saagmeul Street	George Industrial	24	35	51	156
Plattner Golf Pty Ltd	Fancourt Street	Fancourt Proper	< 20	35	<20	<20
Mr/Ms Se&F Tuswa	Versveld Street	Borcherds	< 20	< 20	33	<20
Carmel Evangelical Trust	Farms	Rural Areas	< 20	< 20	33	22
SS Genevafontein Village	Stander Street	Genevafontein	32	31	31	21
SA Police Pacaltsdorp	Hedge Street	Europa	<20	<20	31	<20
Western Cape Laundry (Pty) Ltd	Pioneer Road	Pacaltsdorp Industria	38	30	<20	<20
Plakkers Kleinkrantz	National Road Wilderness	Wilderness	<20	<20	29	<20
-	Sandkraal Road	Conville	<20	<20	29	<20
Watson-Trustees (Water)	Cradock Street 44	George South	23	29	25	<20
SS Wilderness Resort Hotel	Water Side Road Wilderness	Wilderness	49	28	30	<20
Dept Social Development	Golf Street	Ballotsview	26	25	55	24
Streeksverteenwoordiger	Gwayang	Fancourt South	24	25	33	29
Jan van Rensburg Familietrust	Abbatoir Road	George Industrial	24	24	47	41
Mr/Ms M Mateza Primary School	Ngcakani Road	Zone 1	<20	24	<20	<20

Table C.5.10: Large water users for the last four financial years (AADD > 20 kl/d)						
Consumer	Address	Suburb Category	AADD (Kl/d)			
			2020	2021	2022	2023
Municipal Store	Cathedral Street 158	Central Business District	23	23	<20	<20
Express Drycleaners Pty Ltd	Foundry Street	George Industrial	<20	23	28	<20
Wilderness Beach Hotel	National Road Wilderness	Wilderness	<20	<20	23	48
Kenntner Wilderness Dune Development Pty Ltd	National Road Wilderness	Wilderness	25	22	25	27
Primary School Outeniqua	Cradock Street 116	Central Business District	<20	22	23	<20
S A Breweries Hops Farm	Farms	Rural Areas	<20	22	<20	<20
Thembalethu High School	Qhawa Street	Zone 9	<20	<20	22	22
Lagoon Beach Wilderness 102 CC	Doneraile Street	Central Business District	<20	<20	22	<20
Andre Fourie Eiendomme (A F Fourie)	York Street	Central Business District	<20	21	<20	<20
Fairvest Prop Holdings Ltd	Knysna Road	Commercial East	24	19	28	25
The Waves at Wilderness HOA	Sixth Avenue Wilderness	Wilderness	21	19	<20	<20
Outeniqua High School	Knysna Road	Bodorp	20	19	24	<20
Heidedal Primary School	Badnall Street	Borcherds	34	19	23	39
Rouxclean CC	Clay Road 6	George Industrial	49	<20	<20	<20
SS King George Gholf Suites	George Rex Drive	King George Park	29	<20	20	27
Carpe Diem	Meade Street	George Industrial	27	<20	26	29
Mr/Ms H Gertse	Kondor Street 56	Urbansville	26	<20	<20	<20
Pirates Creek Homeowners Association	Anchorage Lane Wilderness	Wilderness	23	<20	<20	<20
Municipality Streets	Brick Road	George Industrial	22	<20	<20	<20
Lancelot Terraces Regspersoon	Fichat Street	Dormehlsdrift	22	<20	<20	21
Cshell 172 Pty Ltd	Doneraile Street 18	Central Business District	22	<20	<20	<20
City Lodge (Airport) Proprietary Limited	Farms	Garden Route Mall	21	<20	<20	22
Bassau Investments (Pty) Ltd	York Street	Toeriste gebied	21	<20	<20	<20
Biotek Ind Park Pty Ltd	Meul Street 14	George Industrial	21	<20	<20	<20
George Snr Secondary School	Mission Road 2	George Industrial	20	<20	<20	<20
Olympia Skool	Battalion Road	Pacaltsdorp Industria	<20	<20	<20	29
Mr Bishops Court Prop R F Pty Ltd	Ngcakani Road	Zone 1	<20	<20	<20	28
Mr DP Lottering	Merriman Street 128	Central Business District	<20	<20	<20	27
Senior Sek Skool Pacaltsdorp	Beach Road 1	Oudorp	<20	<20	<20	27
Carina Sentrum Pty Ltd	Market Street 87	Central Business District	<20	<20	<20	26
Imizamo Yethu Secondary School	Ngcakani Road	Zone 2	<20	<20	<20	30

Progress made with the installation of water efficient devices:

Water efficient devices were installed at all municipal buildings in the municipal area. One of the future WDM measures to be implemented by George Municipality is to include the installation of low flow shower heads, dual flush low flow toilet cisterns and any other measures specified by George Municipality in the Deed of Sales of erven.

C.6. Water Services Asset Management

George Municipality updated their current Asset Register during the 2022/2023 financial year. The tables below give an overview of George Municipality's Water and Sewerage assets as included in the Municipality's Asset Register on the 30th of June 2023, as received from the Finance Department.

Water Infrastructure: The Total Cost and Book Value of the water infrastructure of George Municipality is summarised in the table below, as included in the June 2023 Asset Register.

Table C.6.1: Total Cost and Book Value of the water infrastructure

Asset Type	Total Cost	Book Value	Book Value / Total Cost
Mains	R13 034 853	R4 964 218	38.08%
Meters	R43 346 821	R36 420 024	84.02%
Pipelines	R80 605 401	R35 721 711	44.32%
Pump Stations	R68 857 299	R26 721 017	38.81%
Reservoirs / Tanks	R209 805 305	R184 627 111	88.00%
Supply and Reticulation	R274 418 256	R110 556 010	40.29%
Purification Works	R180 043 528	R116 517 908	64.72%
Plant and Equipment	R33 493 802	R17 752 794	53.00%
Total	**R903 605 265**	**R533 280 793**	**59.02%**

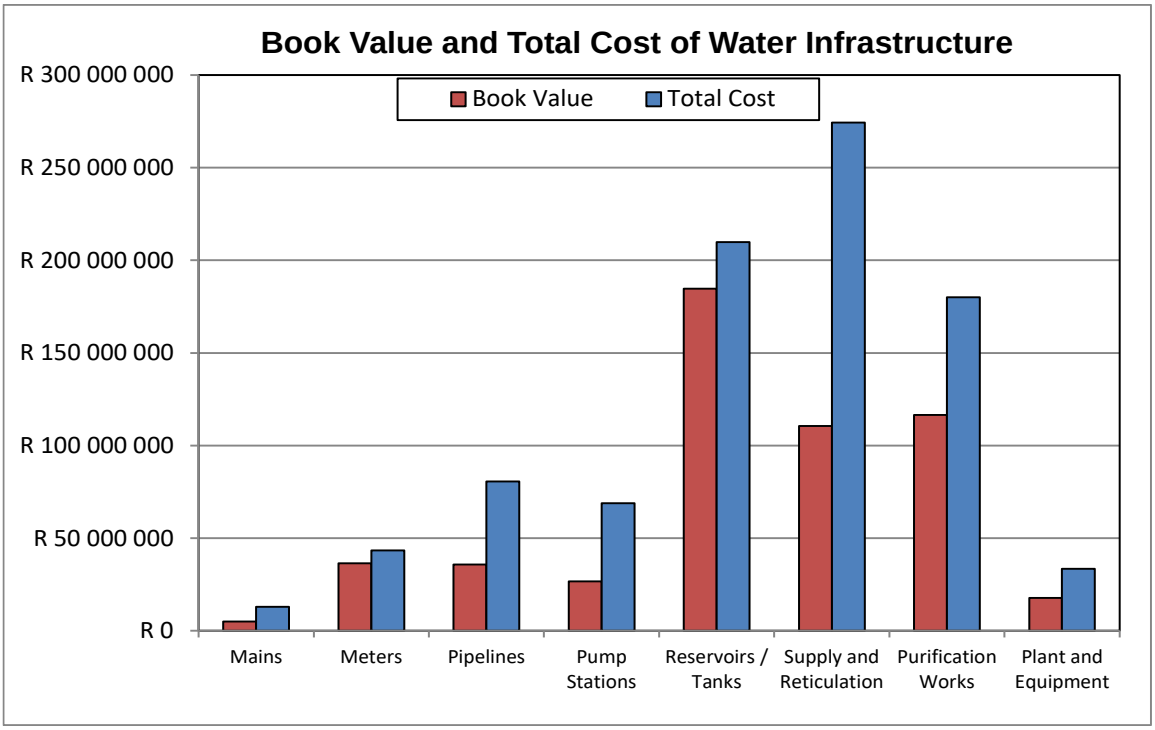


Figure C.6.1: Book Value and Total Cost of the water infrastructure

The previous table indicates that 40.98% of the value of the water infrastructure has been consumed.

The following table and graph give an overview of the RUL by facility type for the water infrastructure, as included in the June 2023 Asset Register (Total Cost).

Table C.6.2: Overview of the RUL by facility type for the water infrastructure (Total Cost)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Mains	R669 547	R12 057 084	R308 222	R0	R0
Meters	R8 571 842	R5 048 983	R29 725 996	R0	R0
Pipelines	R4 434 047	R73 356 549	R0	R2 814 805	R0
Pump Stations	R43 261 271	R19 361 894	R4 202 608	R0	R2 031 526
Reservoirs / Tanks	R146 459 993	R16 008 626	R2 566 498	R44 770 188	R0
Supply and Reticulation	R134 346 485	R102 358 298	R23 211 205	R14 502 268	R0
Purification Works	R 87 787 535	R84 684 438	R1 241 950	R4 422 276	R1 907 329
Plant and Equipment	R17 700 052	R15 215 639	R0	R578 111	R0
Total	**R443 230 772**	**R328 091 511**	**R61 256 479**	**R67 087 648**	**R3 938 855**

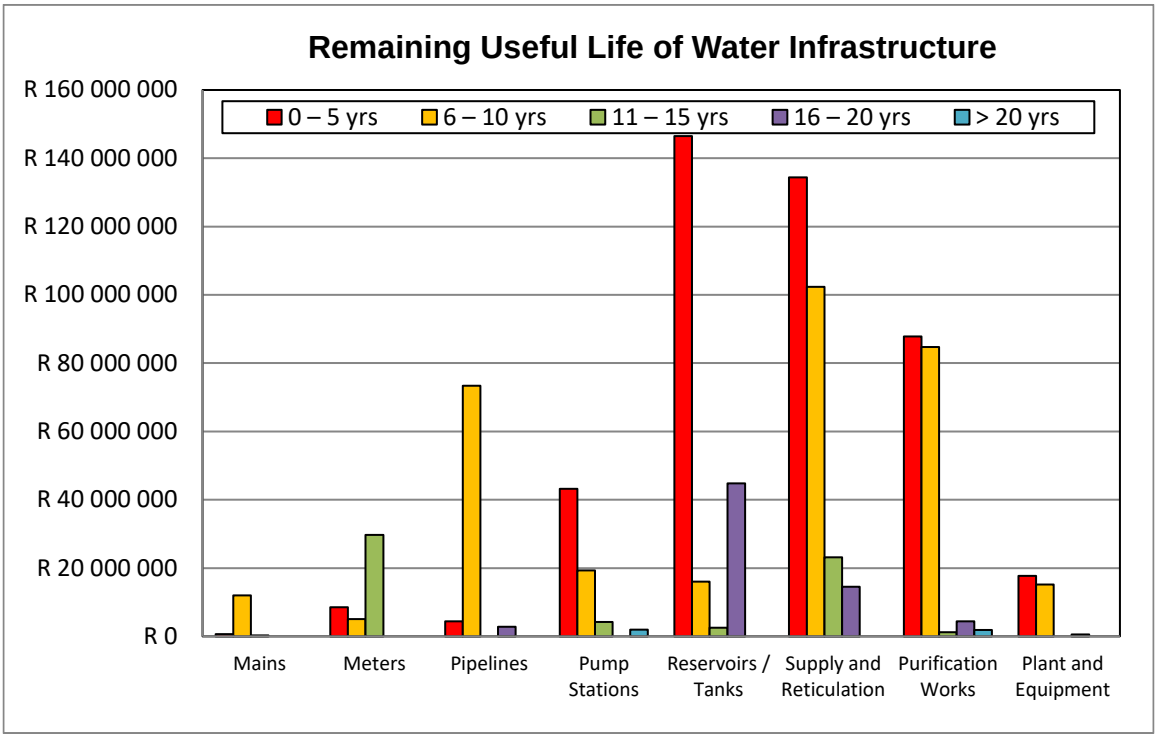


Figure C.6.2: Remaining Useful Life of the water infrastructure

The following table and graph give an overview of the age distribution by facility type for the water infrastructure, as included in the June 2023 Asset Register (Total Cost).

Table C.6.3: Overview of age distribution by facility type for the water infrastructure (Total Cost)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Mains	R669 547	R308 222	R12 049 829	R0	R7 255
Meters	R35 543 865	R1 569 087	R2 955 660	R1 285 036	R1 993 173
Pipelines	R7 248 852	R0	R73 356 549	R0	R0
Pump Stations	R8 984 525	R4 202 608	R19 210 510	R33 668 398	R2 791 258
Reservoirs / Tanks	R187 687 197	R2 555 773	R12 353 378	R54 075	R7 154 882
Supply and Reticulation	R48 142 383	R22 375 057	R86 138 517	R74 990 454	R42 771 845
Purification Works	R82 829 077	R3 263 675	R80 536 509	R8 344 551	R5 069 716
Plant and Equipment	R12 493 930	R95 799	R17 069 164	R1 545 531	R2 289 378
Total	**R383 599 376**	**R34 370 221**	**R303 670 116**	**R119 888 045**	**R62 077 507**

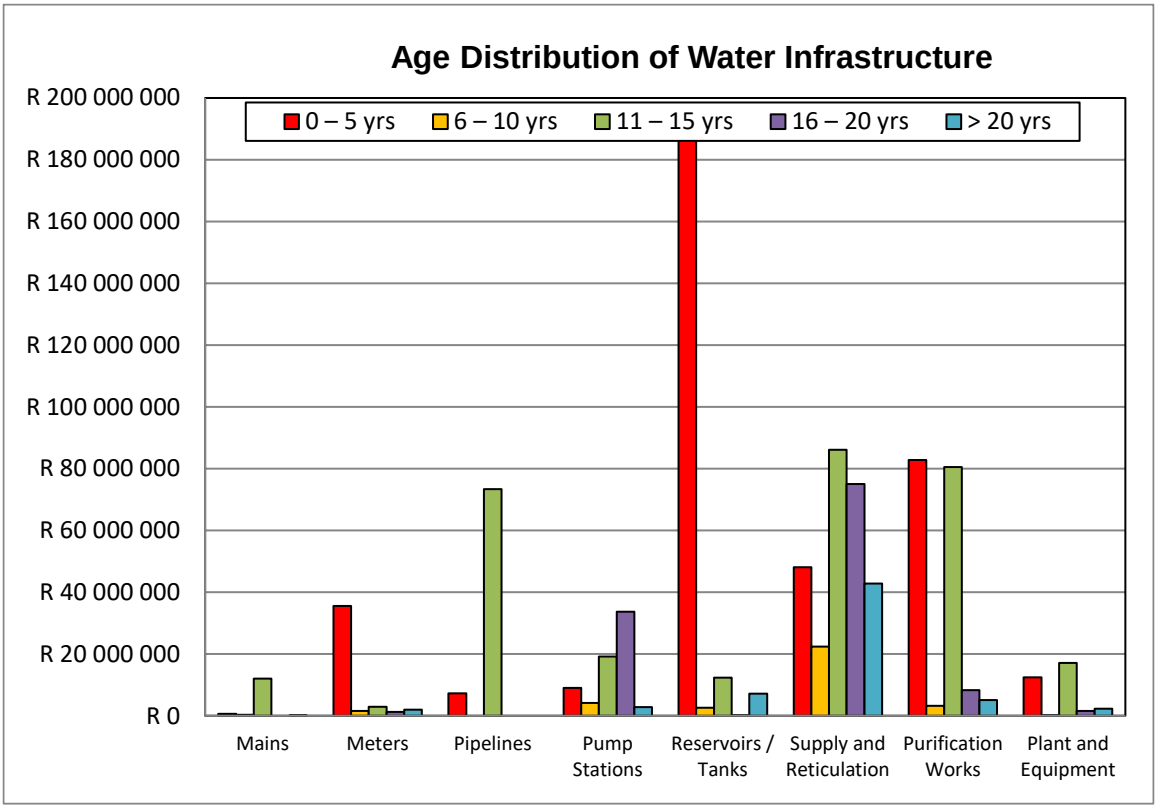


Figure C.6.3: Age distribution of water infrastructure

The asset renewal needs for the water infrastructure assets over the next ten years is R77.132 million per year. The reinvestment required is R443.231 million in the first five-year and R328.092 million in the second five-year period. The age of 6.87% of the water infrastructure assets is greater than twenty years.

Sewerage Infrastructure: The Total Cost and Book Value of the sewerage infrastructure of George Municipality is summarised in the table below, as included in the June 2023 Asset Register.

TableC.6.4: Total Cost and Book Value of all sewerage infrastructure

Asset Type	Total Cost	Book Value	Book Value / Total Cost
Outfall Sewers	R8 121 516	R7 646 035	94.15%
Purification Works	R231 928 059	R193 772 912	83.55%
Pump Stations	R124 387 839	R101 204 416	81.36%
Sewers	R328 124 148	R168 592 608	51.38%
Sludge Machines	R6 135 487	R2 203 258	35.91%
Plant and Equipment	R60 862 145	R35 805 855	58.83%
Totals	**R759 559 194**	**R509 225 085**	**67.04%**

The previous table indicates that 32.96% of the value of the sewerage infrastructure has been consumed.

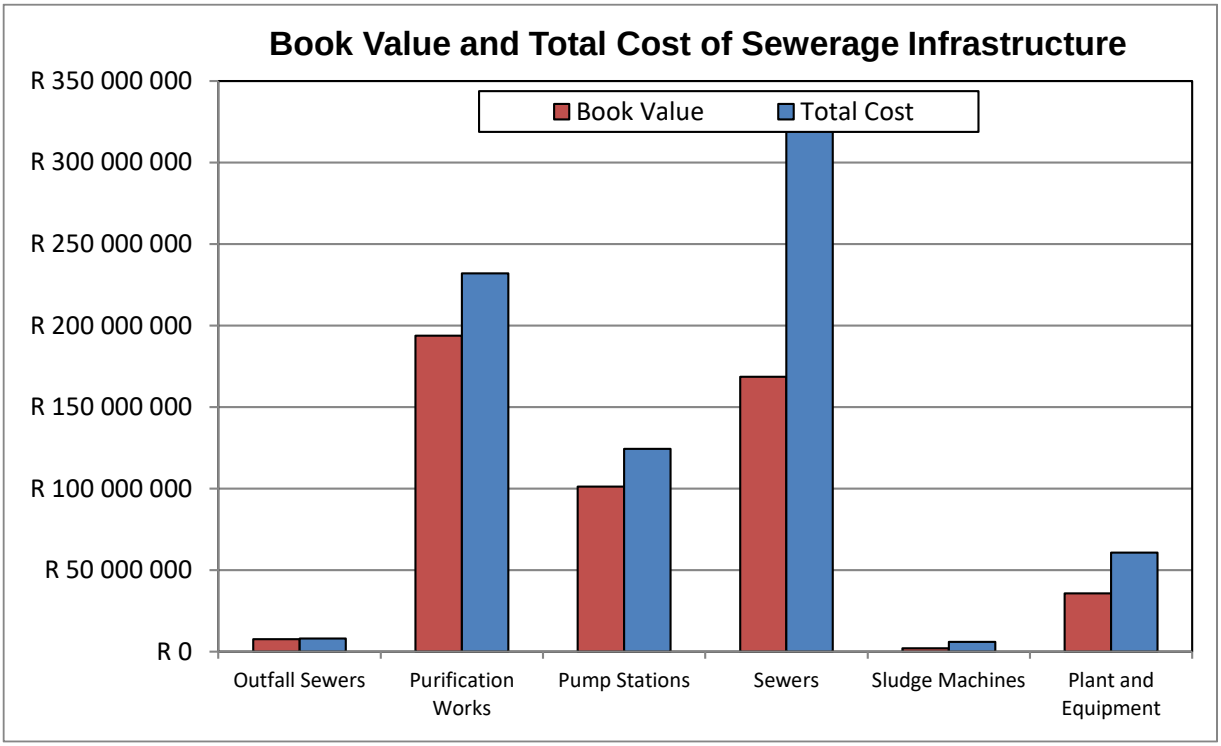


Figure C.6.4: Book Value and Total Cost of the sewerage infrastructure

The following table and graph give an overview of the RUL by facility type for the sewerage infrastructure, as included in the June 2023 Asset Register (Total Cost).

Table C.6.5: Overview of the RUL by facility type for the sewerage infrastructure (Total Cost)

Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Outfall Sewers	R6 841 561	R297 639	R982 316	R0	R0
Purification Works	R139 171 103	R35 513 884	R30 269 512	R26 973 560	R0
Pump Stations	R101 574 580	R10 384 675	R5 634 963	R6 793 621	R0
Sewers	R120 443 545	R116 274 191	R29 042 295	R62 364 117	R0
Sludge Machines	R4 504 391	R1 363 801	R267 295	R0	R0
Plant and Equipment	R21 931 242	R15 073 036	R8 943 271	R7 567 131	R7 347 465
Totals	**R394 466 422**	**R178 907 226**	**R75 139 652**	**R103 698 429**	**R7 347 465**

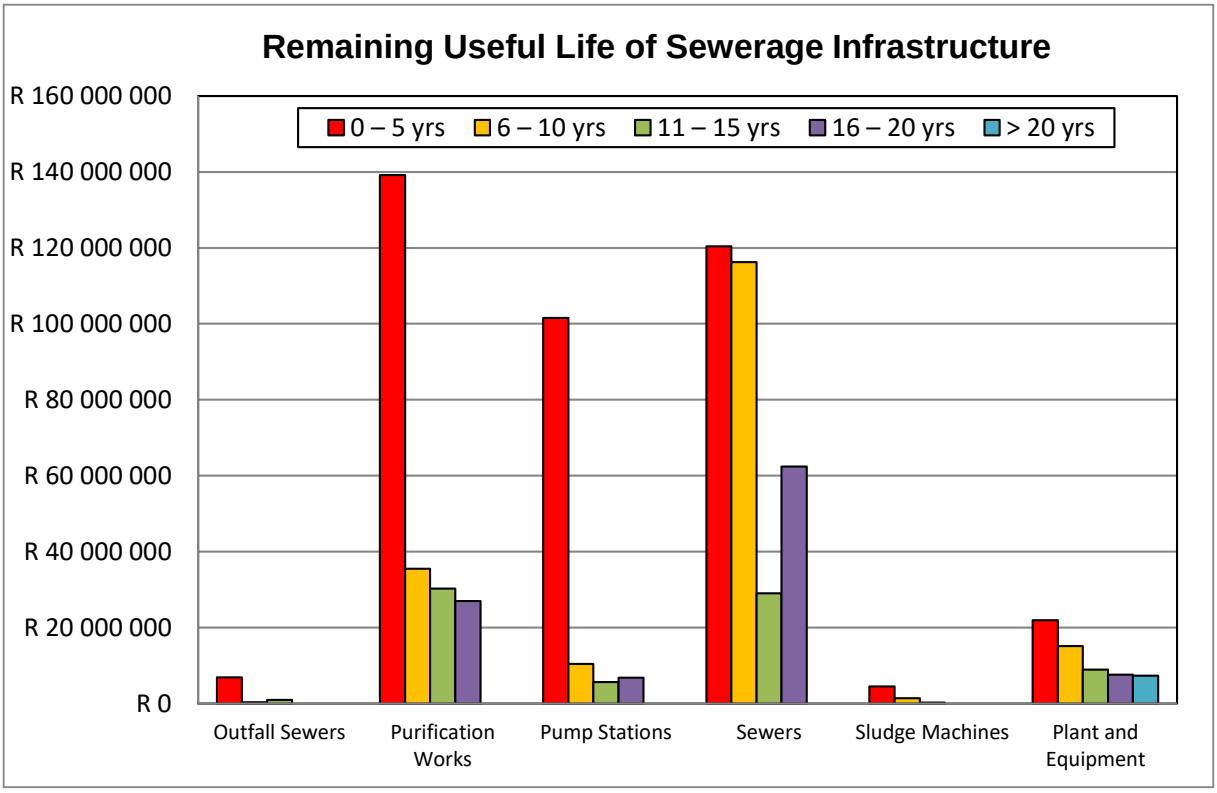


Figure C.6.5: Remaining Useful Life of the sewerage infrastructure

The following table and graph give an overview of the age distribution by facility type for the sewerage infrastructure, as included in the June 2023 Asset Register (Total Cost).

Table C.6.6: Overview of the age distribution by facility type for the sewerage infrastructure (Total Cost)

Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Outfall Sewers	R6 841 561	R982 316	R297 639	R0	R0
Purification Works	R158 174 301	R30 269 512	R35 625 362	R6 419 872	R1 439 013
Pump Stations	R90 772 668	R9 059 092	R12 089 700	R10 545 838	R1 920 541
Sewers	R104 491 379	R29 042 295	R99 031 822	R48 616 785	R46 941 866
Sludge Machines	R1 344 305	R1 363 801	R0	R0	R3 427 381
Plant and Equipment	R21 259 544	R18 515 197	R15 838 981	R5 072 321	R176 102
Totals	**R382 883 758**	**R89 232 214**	**R162 883 505**	**R70 654 815**	**R53 904 903**

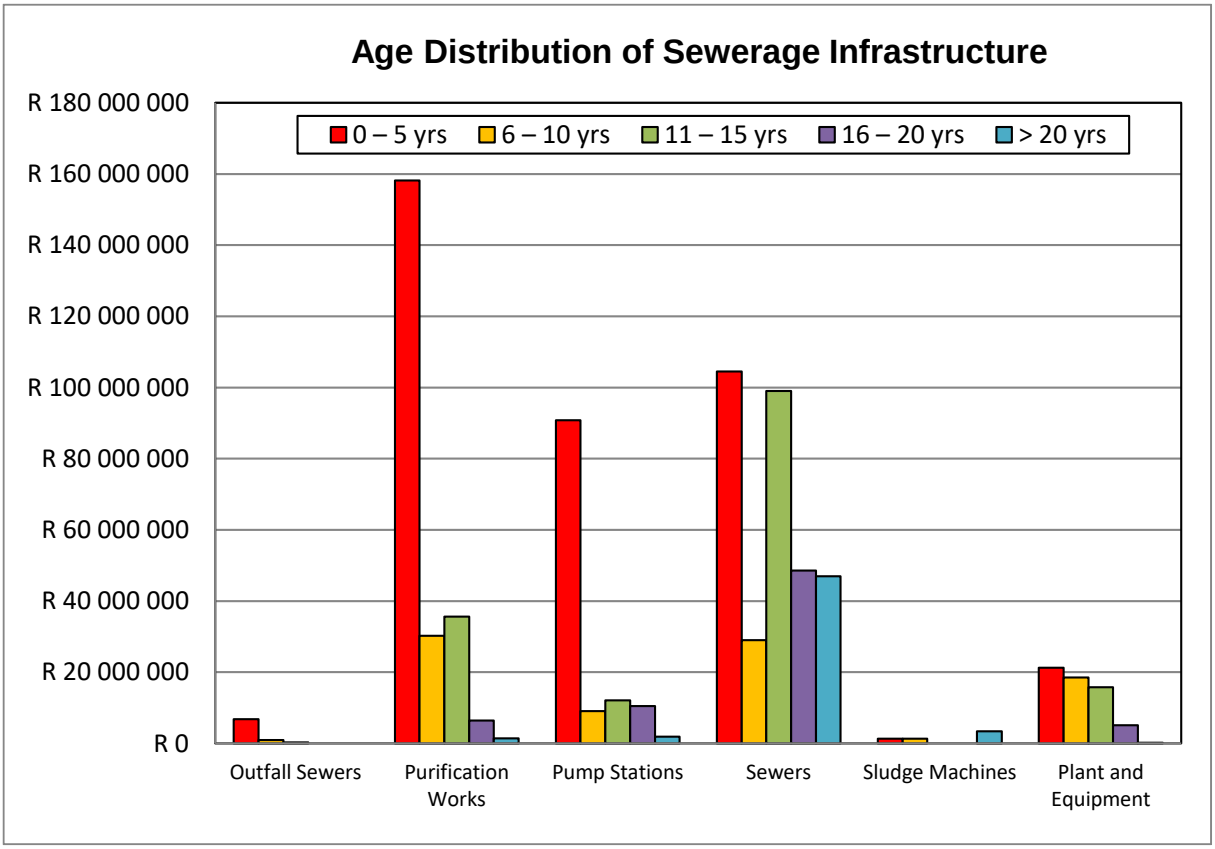


Figure C.6.6: Age distribution of the sewerage infrastructure

The asset renewal needs for the sewerage infrastructure assets over the next 10 years is R57.337 million per year. The reinvestment required is R394.466 million in the first 5-year and R178.907 million in the second 5-year period. The age of 7.10% of the sewerage infrastructure assets is greater than 20 years.

Some of the key challenges of George Municipality are to identify adequate funds for the rehabilitation and maintenance of their existing infrastructure, which is critical to ensure the sustainability of the services that are provided by the Municipality. It is important for the Municipality to secure adequate funding for major refurbishment and maintenance work, the provision of bulk infrastructure and development of additional sources to keep up with the high demand for services.

C.7. Water Services Operation and Maintenance

George Municipality practices the following planned and unplanned preventative and corrective maintenance, as summarised in the table below.

Table C.7.1: Types of Planned and Unplanned Preventative and Corrective Maintenance implemented by George Municipality	
Design-out Maintenance: Design-out Maintenance originates on the drawing board and is aimed at improving the operation, reliability or capacity of equipment. The engineer follows a life cycle approach to infrastructure development.	
Preventative Maintenance: Preventative maintenance is based on planning. For example, breakdowns at a plant can be reduced to a minimum if it is planned that all wearing parts are to be replaced before they fail.	Systematic (Periodic Maintenance): Systematic maintenance is periodic maintenance where the servicing of equipment takes place at regular intervals, either in accordance with a time schedule or on the basis of predetermined units of use, to eliminate possible causes of failure before a breakdown occurs. Systematic maintenance requires a servicing schedule, which is based on the manufacturer's guidelines for equipment. Condition-based (Predictive) Maintenance: Condition-based maintenance is predictive maintenance based on regularly inspecting equipment and infrastructure in order to assess the state of wear and tear. Any failures that are observed, complemented by the findings of the programmed inspections and checks, are then dealt with through corrective action, so as to avoid breakdowns or the deterioration of a condition that could pose a safety hazard.
Corrective or Breakdown Maintenance: It is important to work methodically to keep repair time as short as possible. Good work preparation, use of correct (and well maintained) tools and equipment, and gathering and processing of all data relevant to the repairs helps to avoid downtime, eliminate mistakes and improve operational conditions.	Planned (Scheduled Repairs) Unplanned repairs guided by Troubleshooting: Troubleshooting is used when poor condition causes either total or partial stoppages, or when operations take place under intolerable conditions.

George Municipality's operation and maintenance assessments and plans for their water and sewerage infrastructure are indicated in the table below.

Table C.7.2: George Municipality's Operation and Maintenance Assessments and Plans		
Element	**Assessment Criteria**	**Status Quo**
Resources		
Staff	Sufficient staff numbers. Competency level of staff at all levels. Level of service provided by staff. Empowerment and training (Adequately trained for position, Safety regulation and Commitment). Responsibility allocation (organisational structure) and acceptance thereof.	Minimum requirement: Additional Process Controllers need to be appointed to comply with the legislative requirements with regard to the number and Class of Process Controllers per WTW and WWTWs per shift. Work Place Skills Programme is compiled annually to ensure adequate training of staff.
External Resources	Need for external resource providers. Competency level and value for money. Management and control over these providers.	Not applicable: All Water Service Provider functions are currently done internally by George Municipality.
Spare Parts	Adequate materials provisioning. Store management (Sufficient stock kept, stock control and delivery time).	Adequate: Municipality ensures adequate spare parts are available in their stores for possible failures or breakdowns. Monitored by the Civil Engineering Services Directorate.
Tools and Equipment	Adequate tools and equipment provided. Control and maintenance.	Adequate: Municipality ensures adequate tools and equipment are available. Monitored by the Civil Engineering Services Directorate.
Budget	Adequate budget provided. Budget control. Identification and documentation of needs. Budget preparation and motivation.	Adequate: Required Financial Strategies, Policies and Systems are in place to ensure proper budget control.
Information		
Manuals	Existence of manuals (operation / maintenance or manufacturer). Record keeping / safekeeping and control. Utilisation of manuals by staff.	Adequate: O&M Manuals are in place for the bulk water and sewerage infrastructure. These Manuals are also used by the Process Controllers at the plants. The O&M Manuals for the WTW and WWTWs will be updated during the 2023/2024 financial year.
Asset Register	Existence of an asset register.	Minimum requirement: The current Asset Register for the

Table C.7.2: George Municipality's Operation and Maintenance Assessments and Plans		
Element	**Assessment Criteria**	**Status Quo**
	Maintenance / updating of asset register. Accessibility of information. Control over assets. Stock taking.	water and sewerage infrastructure indicates the Total Costs and the Book Values. The RUL and Age of the infrastructure are also included in the Asset Register. The Asset Register is updated annually. The CRC of the water and sewerage infrastructure and the condition also needs to be included. An Asset Management Plan needs to be compiled to ensure efficient, effective and optimal management , operation and maintenance of all assets.
As-built Information	Existence of as-built drawings. Existence of important reports e.g. design reports etc. Record keeping / safekeeping and control. Accessibility of information. Updating of records.	Adequate: As-built information is available for all water and sewerage infrastructure. The information is also included in the IMQS of the Municipality. The information is regularly updated when the Water and Sewer Master Plans are updated.
Tools and Equipment	Existence of information on tools and equipment. Record keeping / safekeeping and control. Accessibility of information.	Adequate: Managed by the Operational Personnel at the various Municipal stores, with the required control forms that are in place. Monitored by the Civil Engineering Services Directorate.
Contingency and Safety Plans	Compliance to safety requirements. Safety equipment and maintenance thereof. Existence of safety plan where required. Existence of contingency plan where required.	Adequate: Updated Water Safety Plans and W_2RAPs are in place for all the systems. WTW and WWTW Technical Investigations are done when required. Incident Management Protocols, as included in the Water Safety Plans and W_2RAPs, are followed by the personnel. Detail WTW and WWTW Process Audits were completed for all the treatment plants.
Activity Control and Management		
Procedures	Existence of procedures for all activities. Existence of policies – standardisation, quality, operational and maintenance, etc. Correctness of procedures – if in place.	Adequate: Required Procedures and Policies are in place. Water Services Bylaws area also in place. Procedures and Policies are managed by the Civil Engineering Services Directorate.
Record Keeping	Existence of record keeping system. Process of data. Actions activated.	Adequate: Record keeping is sufficient, with most of the required information for the WSDP and Water Services Audit Report kept up to date. The record keeping of certain information is also linked to specific water and sanitation KPIs in the SDBIP. Municipality to implement recommended O&M Control Sheets for groundwater, surface water, bulk water and reticulation networks and fittings, WTWs, WWTWs, water and sewer PSs, reservoirs, remote monitoring and control systems and bulk and sewer drainage networks, as included in the updated WSDP.
Quality Controls	Quality management plan. Quality assurance. Quality control (Inspections, Control charts, trend analysis). Process adjustment and rework. Quality improvement.	Adequate: The required quality control mechanisms are in place to ensure high quality of materials and to ensure that all work carried out on the water and sewerage infrastructure is of a high quality. The Civil Engineering Services Directorate monitors all work carried out by Consultants and Contractors.
Risk Management	Risk management planning. Risk identification. Risk probability and impact assessment. Risk response planning. Risk monitoring and control.	Adequate: Required Risk Management Protocols are in place, which is followed by the personnel. Potential risks/incidents and control measure to reduce or manage these risks were identified as part of the Water Safety Plan and W_2RAP processes.
Reporting	Production and activity reporting (Completeness, evaluation and action activation). Management reporting (Completeness and evaluation and action activation). Performance monitoring.	Adequate: The Deputy Director for Water and Wastewater Services report on a monthly basis to Management and the Council on all the required water and sanitation information. A SDBIP is also in place, linked to specific water and sanitation KPIs, which allows for proper performance monitoring.

Pipe bursts and other serious damage to pipes immediately interrupts services to the affected area and is rapidly addressed by George Municipality. O&M is a continuous process for George Municipality involving various activities, with the ultimate purpose of delivering good quality services to all customers at all times and keeping the percentage of water lost through pipe bursts and other serious damage to pipes as low as possible. George Municipality's O&M Plan depends on a range of factors such as the age and condition of the water supply system, requirements of the Municipality and DWS as the regulating authority, the availability of staff, plant, equipment, spares, money and other resources.

George Municipality has standby teams available after hours and over weekends, besides the planned and scheduled O&M activities, in order to allow for unscheduled responses to service breakdowns due to mal-functioning equipment, vandalism, emergency situations, etc. This allows George Municipality to be able to quickly assess service breakdowns and re-allocate staff and resources to do unscheduled repairs, and then quickly return to the regular and scheduled O&M activities. The Municipality ensures that sufficient repair materials, consumables and back-up equipment are also readily available for any potential breakdowns.

A budget of approximately 2% of the total asset value per annum should be allocated towards the replacement of existing infrastructure. In the case of the operations and maintenance of the systems, a budget of approximately 1% to 2% of the value of the system is typically required to ensure that the systems remain in good condition.

The table below gives an overview of the Total Costs and Book Values of the water and sewerage infrastructure included in George Municipality's Asset Register (June 2023), as well as the CRC of the water and sewerage infrastructure as included in the WSDP. The recommended budgets for the replacement of the existing infrastructure and the operation and maintenance of the existing infrastructure, based on the CRC of the assets in the WSDP, are also indicated.

Table C.7.3: Recommended budgets for the replacement and the operation and maintenance of the existing water and sewerage infrastructure.

Asset Type	Asset Register June 2023		CRC (WSDP:2019)	Required Annual Replacement Budget (Best Practice)	Required Annual O&M Budget (Best Practice)
	Total Costs	Book Values		2.0%	1.5%
Boreholes	Included below	Included below	R1 317 000	R26 340	R19 755
Mains	R13 034 853	R4 964 218	R818 283 000	R16 365 660	R12 274 245
Meters	R43 346 821	R36 420 024			
Pipelines	R80 605 401	R35 721 711			
Supply and Reticulation	R68 857 299	R26 721 017	R887 120 000	R17 742 400	R13 306 800
Pump Stations	R209 805 305	R184 627 111	R90 358 000	R1 807 160	R1 355 370
Reservoirs / Tanks	R274 418 256	R110 556 010	R199 733 000	R3 994 660	R2 995 995
Purification Works	R180 043 528	R116 517 908	R567 558 000	R11 351 160	R8 513 370
Plant and Equipment	R33 493 802	R17 752 794			
Sub Total Water	**R903 605 265**	**R533 280 793**	**R2 564 369 000**	**R51 287 380**	**R38 465 535**
Outfall Sewers	R8 121 516	R7 646 035	R1 903 273 000	R38 065 460	R28 549 095
Sewers	R231 928 059	R193 772 912			
Pump Stations	R124 387 839	R101 204 416	R273 909 000	R5 478 180	R4 108 635
Purification Works	R328 124 148	R168 592 608	R496 119 000	R9 922 380	R7 441 785
Sludge Machines	R6 135 487	R2 203 258			
Plant and Equipment	R60 862 145	R35 805 855			
Sub Total Sewerage	**R759 559 194**	**R509 225 085**	**R2 673 301 000**	**R53 466 020**	**R40 099 515**
Total Water and Sewerage	**R1 663 164 459**	**R1 042 505 878**	**R5 237 670 000**	**R104 753 400**	**R78 565 050**

Most of the major replacement of old water and sewerage infrastructure in George Municipality is done through the Municipality's annual capital budget. The capital budget however also includes new infrastructure. The table below gives an overview of the total historical water and sewerage capital expenditure for the last five financial years.

Table C.7.4: Historical annual water and sewerage capital expenditure

Infrastructure	22/23	21/22	20/21	19/20	18/19
Water	R257 462 099	R25 043 002	R7 740 360	R23 786 216	R18 067 322
Sewerage	R109 449 415	R122 463 110	R31 656 502	R14 315 491	R46 726 826
Total	**R366 911 514**	**R147 506 112**	**R39 396 862**	**R38 101 707**	**R64 794 148**

C.8. Water Resources

IWA Water balance models were developed for each of the distribution systems within George Municipality's Management Area, which are included in Annexure A. Graphs of the total water requirements (bulk raw water supply, system input volume and billed metered consumption), peak month factors, annual treatment losses, annual NRW and annual water losses per distribution system and water usage per sector are included in Annexure A.

Detailed future water requirement projection models were developed for each of the distribution systems and the future water requirements are indicated in the table below. These models include the future projections up to 2047 and were calibrated by using historic billed metered consumption data and bulk abstraction data. The percentage of water losses was determined for each of the distribution systems and growth in future water requirement was based on agreed population and growth figures.

Table C.8.1: Projected future water requirements and yield / licence surplus (+) / shortfall (-) based on WSDP model

Distribution System	Model	PROJECTED FUTURE WATER REQUIREMENTS (Ml/a)				
		2027	2032	2037	2042	2047
George and Wilderness	2.0% Annual Growth	14 772.235	16 309.741	18 007.272	19 881.483	21 950.764
	3.5% Annual Growth	15 890.848	18 873.343	22 415.611	26 622.714	31 619.433
	WSDP Model	14 515.314	16 630.158	19 085.389	21 939.384	25 261.023
	Yield surplus (+) / shortfall (-)	**+2 484.686**	**+369.842**	**-2 085.389**	**-4 939.384**	**-8 261.023**
Uniondale	1.5% Annual Growth	350.781	377.890	407.095	438.557	472.451
	3.0% Annual Growth	377.478	437.600	507.299	588.098	681.767
	WSDP Model	**336.386**	**346.539**	**359.170**	**374.265**	**391.868**
	Yield surplus (+) / shortfall (-)	**+360.614**	**+350.461**	**+337.830**	**+322.735**	**+305.132**
Haarlem	1.5% Annual Growth	197.660	212.936	229.393	247.121	266.219
	3.0% Annual Growth	212.704	246.582	285.856	331.385	384.166
	WSDP Model	176.613	173.797	171.572	169.868	168.623
	Allocation surplus (+) / shortfall (-)	**+53.387**	**+56.203**	**+58.428**	**+60.132**	**+61.377**

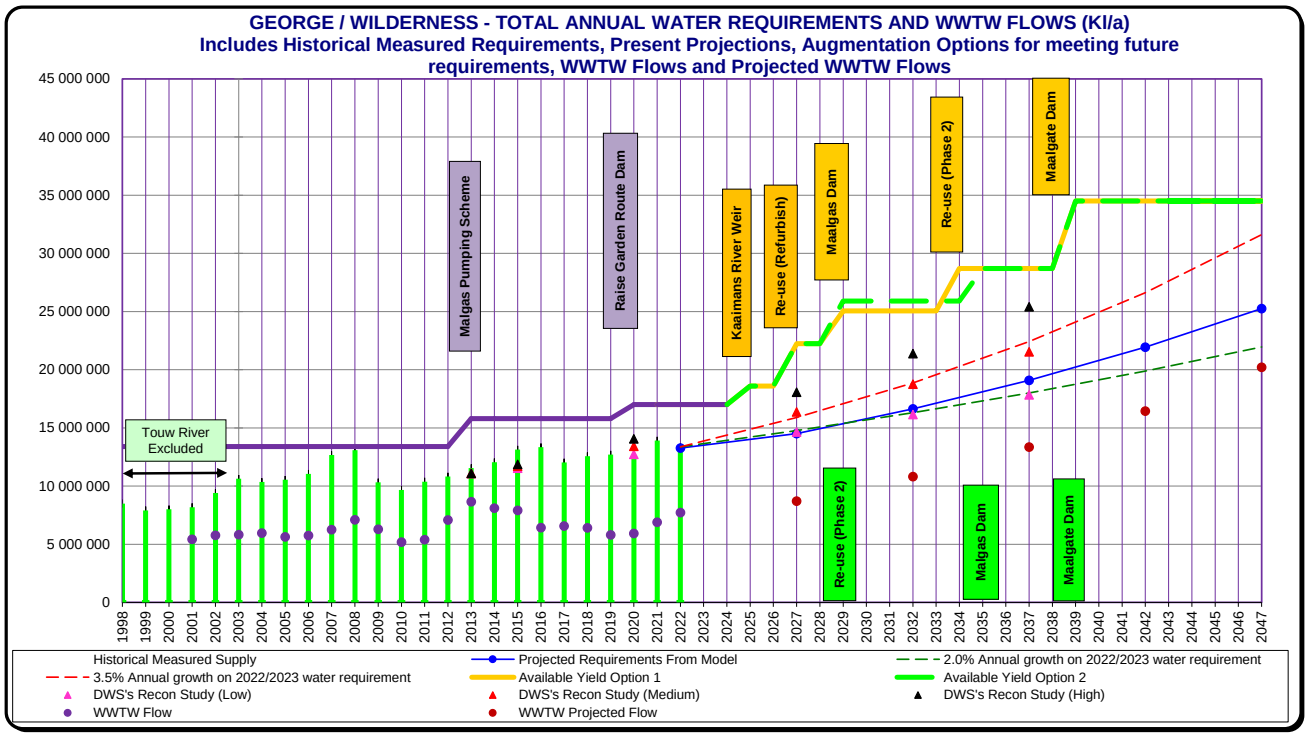


Figure C.8.1: Future water requirement projections for the George / Wilderness water distribution system

The table below gives an overview of the years in which the annual water requirement is likely to exceed the sustainable yield from the various resources.

Table C.8.2: Years in which the annual water requirement will exceed the sustainable yield from the various resources				
Distribution System	**Total sustainable Yield or Allocation (x 10^6 m^3/a)**	**Annual Growth on 2022/2023 requirement (1.5% or 2.0%)**	**Annual Growth on 2022/2023 requirement (3.0% or 3.5%)**	**WSDP Projection Model**
George / Wilderness	17.000 (Yield)*	2033 (2.0%)	2028 (3.5%)	2032
Uniondale	0.697 (Allocation)	> 2047 (1.5%)	> 2047 (3.0%)	> 2047
Haarlem	0.230 (Allocation)	2037 (1.5%)	2029 (3.0%)	> 2047

Note * Include Malgas Pumping Scheme and Raised Garden Route Dam

A licence to abstract a maximum volume of 21 330 000 m³/a of water from various resources for water services supply for domestic and industrial use within the urban edge of the town of George was received from the DWS during 2015. The approved volumes are summarised in the table below:

Table C.8.3: Approved Licence for George (No. 16/K30C/C/2531)			
Reference Name	**Abstraction Point**	**Water Resource**	**Maximum Volume (Million m³/a)**
Garden Route Dam	Garden Route Dam Pump Station	Swart River	13.63
Kaaimans River	Kaaimans River Pump Station and Diversion	Kaaimans River	2.77
Swart River Dam	Swart River Dam	Swart River	0.73
Malgas Pump Scheme	Malgas Pump Station	Malgas River	4.20
Total			**21.33**

Source Studies: The project for the raising of the Garden Route dam spillway by 2.5 metres was started on the 13th of May 2019 and completed during December 2019. The total storage capacity of the Garden Route dam was increased by approximately 25% to 12.5 million m³.

George Municipality is currently busy with a Water Resource Augmentation Study for the George/Wilderness, Uniondale and Haarlem systems, which is expected to be completed by April / May 2024. The Scope of Work for the Study include the following tasks:

- Bulk Water Resource Study and Report: Introduction, Water Usage and Requirements (Domestic and Industrial / Agricultural), Hydrology and System Analysis, Water Resources / Schemes (Surface and Groundwater sources existing, proposed and water rights / abstraction licenses), Development of water resources, Environmental aspects and constraints, Financial assessment, Implementation Programme, Conclusion and Recommendations.
- Dam Calibration Survey: Garden Route Dam
- WC/WDM: Review current WDM Strategy and formalize into a policy (Ensure adherence to the No Drop programme requirements).
- Drought Management: Review current drought management policy, update the policy and align the raw water resource capacities with the study.
- Screening Process: Stakeholder Engagement (Public participation / Interest) and Multi-disciplinary study / workshop.
- Final / amended Bulk Water Resource Study Report on conclusion of screening process.
- Project Management and additional services required.

George Municipality is currently busy with the planning for the refurbishment of the RO plant at the Outeniqua WWTW. A groundwater testing pilot project is also being implemented.

The short, medium and long term options previously evaluated through the George Bulk Water Supply Study (2007-2008), to augment the supply to George, included the following.

Table C.8.4: Short, medium and long term source augmentation options

Proposed Option	Comment
Short to Medium Term Augmentation Options	
Water Demand Management	Implementation ongoing.
Refurbishment of Kaaimans River Weir	Was implemented, currently not operational.
Malgas River Pumping Scheme	Was implemented
First Phase of the Re-use of Treated Effluent	Was implemented, to be refurbished.
Raising of Garden Route Dam Spillway	Was implemented
Medium to Longer Term Augmentation Options	
Second Phase of the Re-use of Treated Effluent	Will be considered
The proposal is to process and supply an additional 5 to 10 Ml/d after Phase 1. The effluent will be pumped from the Gwaing WWTW through a 4.5 km pipeline to the post treatment plant at Outeniqua WWTW. The main infrastructure required is as follows: • A 5 – 10 Ml/d pump station at Gwaing WWTW; • A 1.5km 400mm dia. rising main to a high point; • A balancing tank situated at the high point; • A 3 km gravity main from the high point to the Outeniqua WWTW; • Upgrade the Ultra filtration plant at the Outeniqua WWTW to 15 – 20 Ml/d; and • Upgrade the treated effluent pump station at Outeniqua WWTW to 15 – 20 Ml/d. The estimated cost for Phase 2 of the re-use of treated effluent is R75 million (VAT Excluded)	
Proposed Malgas Dam	Being considered
This options comprises a dam on the Malgas River with a storage capacity of 11 million m³ and a firm yield of 5.2 million m³/a. A conventional earth dam would be most economical, assuming that a suitable core material source could be identified in close proximity to the dam site. The proposed dam wall would be 60m high. The approximately 7.3km of pipeline from the Malgas Pumping Scheme will be utilized to convey water from the dam to the balancing dams at the WTW. The estimated cost of constructing a dam is R130 million (VAT Excluded).	
Longer Term Augmentation Options	
Proposed Maalgate Dam	Feasible, if land acquisition issues can be resolved
The proposed Maalgate Dam would have a storage capacity of 10 million m³ with a yield of approximately 5.8 million m³/a. The dam would have a wall approximately 29m high, with a maximum water depth of 25m and a surface area of approximately 100 ha at full supply. This scheme would also require the construction of a new pump station, to be situated below the dam wall, and a new 450mm dia. 18km pipeline, which would pump water from the dam to the George WTWs. The estimated cost of constructing the dam is R130 million and R45 million for the pumping scheme (VAT Excluded).	
Proposed Upper Kaaimans River Dam	Not feasible due to potential excessive environmental impacts
The proposed Upper Kaaimans Dam would be a 4 million m³ dam, with a wall height of 43m and a surface area of approximately 28 ha at full supply level. The resulting additional yield from this dam is 2 million m³/a. Surplus water stored in the dam would be released to the river downstream during the dry months and pumped, by the pumps situated at the existing Kaaimans River Weir pump station to the GRD.	
Desalination	Not yet cost effective
Reverse Osmosis is recommended for the George Municipality, due to its flexibility, membrane technology and opportunities for energy recovery. A two phase scheme was assessed as part of the George Bulk Water Supply Study. The plant could start off as a 5 Ml/d plant and then increase to a total of 10 Ml/d over 5 years. Pre-treatment of the seawater, which includes disinfection and pH balancing, is required to reduce fouling and scaling of the membrane. The membranes will, however, require replacement every five years in any event. The resultant waste product referred to as brine would be pumped out to sea, where it would be discharged into the high-energy surf zone. The estimated cost of constructing a 10 Ml/d desalination plant is R250 million (Vat Excluded).	
Groundwater	Being considered but requires further investigation
The groundwater option consists of drilling for water in the high-potential TMG aquifer. This includes various boreholes of varying depth (up to approximately 300m deep), equipped with pumps and gravity pipelines to the Old WTW or the existing balancing dams at the new George WTWs. The conservative yield from these boreholes was determined as 7 to 8 Ml/d. Twenty (20) boreholes have been drilled as part of the emergency augmentation schemes implemented to manage the drought during 2009/2010 and three of these boreholes have been equipped in the short term to provide drought relief, with a combined yield capacity of 2.1 Ml/d. Boreholes with significant yield will be used to monitor ground water. Licenses will be applied for to utilize these boreholes as a future source of potable water for George.	

The DWS is currently busy with the updating of the All Towns Reconciliation Strategies for the Western Cape, but updated strategies for George Municipality are not yet available. The table below gives an overview of the recommended potential future water resources, as included in the 2015 All Towns Reconciliation Strategies, for the towns in George Municipality:

Table C.8.5: Potential future water resources for the various towns (Summary of DWS's All Towns Reconciliation Strategies)

Distribution System	Recommended Summary Options
George / Wilderness	**The water requirement projections indicate that there is currently no shortfall in water supply. Under the high-growth scenario shortfalls can be expected between 2030 and 2035, which would increase in 2040 to 6.802 million m³/a. George LM had to implement various augmentation options over the last number of years in order to prevent a water crisis, as the current water sources did not have adequate supply to cater for the water requirements. The following sources have been included in the integrated licence.** • Re-use of water via the Garden Route Dam (further phases of 4 phase development). • Raise Garden Route Dam Spillway. • Supply from the Malgas Pump Scheme The following sources have been identified as potential sources to augment the future water supply. • Groundwater development in the TMG Aquifer and conjunctive use with Garden Route Dam and / or any new dam. • Local groundwater development to augment water supply to small coastal towns. • Supply from one of the various possible dam schemes in the area, namely Malgas and Maalgate rivers. • Desalination of sea water and groundwater from coastal boreholes. **The Reconciliation Strategy recommends the following interventions for implementation in order of priority and sequence:** • Continue with the implementation of the WC/WDM Strategy. • Water re-use via the Garden Route Dam (Second Phase) in conjunction with the integration of boreholes into the supply scheme. • Raising of Garden Route Dam spillway. • Construction of Malgas Dam. • Water re-use via the Garden Route Dam (Third Phase). • Desalination of seawater.
Uniondale	**The current yield is adequate to cater for current and future water requirements. However the following interventions are required to increase water use efficiency:** • Continue with the implementation of the WC/WDM Strategy to reduce water losses in infrastructure and water consumption. • Rainwater harvesting as part of the WDM Strategy to reduce consumption of potable water. **The following sources have been identified as potential sources to augment the current water supply, if required:** • Increase abstraction from Kammanassie River and/or Holdrif River. • Groundwater development of TMG Aquifer around Uniondale. • Secure domestic use allocation from Haarlem Dam through trading of water rights with irrigators. • Raising of Haarlem Dam to increase domestic allocation. **The Reconciliation Strategy recommends the following interventions for implementation in order of priority and sequence:** • Continue with the implementation of the WC/WDM Strategy to reduce water losses and achieve savings in water consumption. • Groundwater development of TMG Aquifer in close proximity to Uniondale to access storage for increasing assurance of supply. • Increase abstraction from Kammanassie River and Holdrif River through water trading.
Haarlem	**The current yield seems to be adequate for current supply, but is insufficient for future water requirements. The following sources have been identified to augment the current water supply:** • Continue with the implementation of the WC/WDM Strategy to reduce water losses and water consumption. • Rainwater harvesting as part of the WDM Strategy to reduce consumption of potable water. • Increase domestic allocation from Haarlem Dam through trading of water rights with irrigators. • Groundwater development of TMG Aquifer south of Haarlem. • Raising of Haarlem Dam to increase domestic allocation. **The Reconciliation Strategy recommends the following interventions for implementation in order of priority**

Table C.8.5: Potential future water resources for the various towns (Summary of DWS's All Towns Reconciliation Strategies)	
Distribution System	**Recommended Summary Options**
	and sequence: • Continue with the implementation of the WC/WDM Strategy to reduce water losses and achieve savings in water consumption. • Groundwater development of TMG Aquifer in close proximity to the Haarlem Dam and implementing conjunctive use.

Industrial Effluent Monitoring: All industrial effluent discharge into the sewer system of George Municipality is monitored. Water Services By-laws, with regard to the discharge of industrial effluent into the sewer system, are also in place and all industrial consumers formally apply for the discharge of industrial effluent into the sewer system. The quality of the industrial effluent discharged by industrial consumers into George Municipality's sewer system is monitored through a comprehensive sampling programme.

The industrial effluent sample results for the last twelve months (July 2022 – June 2023) are included in Annexure D. The compliance percentages for the quality of industrial effluent discharged into the municipality's sewer system are summarised in the table below for the last five financial years.

Table C.8.6: Compliance percentages of industrial effluent discharged by industrial consumers per parameter for the various financial years

Industrial Consumer	pH	COD	EC	Caustic Alkalinity	Chloride	Settable Solids	Suspended Solids	TDS	Average Compliance
2022/2023									
Industrial Consumer 1	60.0%	0.0%	22.2%	95.6%	88.9%	97.8%	15.6%	95.6%	**59.4%**
Industrial Consumer 2	100.0%	0.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	**37.5%**
Industrial Consumer 3	93.5%	97.8%	97.8%	100.0%	97.8%	100.0%	91.3%	100.0%	**97.3%**
Industrial Consumer 4	83.3%	70.8%	31.3%	100.0%	45.8%	97.9%	64.6%	68.8%	**70.3%**
Industrial Consumer 5	95.5%	97.7%	65.9%	100.0%	77.3%	100.0%	90.9%	88.6%	**89.5%**
Industrial Consumer 6	80.4%	43.5%	65.2%	97.8%	100.0%	78.3%	32.6%	100.0%	**74.7%**
Industrial Consumer 7	87.5%	100.0%	12.5%	100.0%	12.5%	100.0%	75.0%	75.0%	**70.3%**
Industrial Consumer 8	92.1%	86.8%	55.3%	100.0%	71.1%	100.0%	71.1%	94.7%	**83.9%**
Industrial Consumer 9	39.1%	91.3%	17.4%	87.0%	91.3%	100.0%	43.5%	43.5%	**64.1%**
Industrial Consumer 10	95.7%	67.4%	84.8%	95.7%	100.0%	89.1%	43.5%	93.5%	**83.7%**
Industrial Consumer 11	95.5%	22.7%	13.6%	59.1%	90.9%	100.0%	13.6%	18.2%	**51.7%**
2021/2022									
Industrial Consumer 1	54.3%	11.4%	11.4%	100.0%	77.1%	97.1%	2.9%	94.3%	**56.1%**
Industrial Consumer 2	100.0%	12.5%	0.0%	87.5%	100.0%	100.0%	0.0%	50.0%	**56.3%**
Industrial Consumer 3	100.0%	100.0%	100.0%	100.0%	97.4%	100.0%	97.4%	100.0%	**99.3%**
Industrial Consumer 4	94.9%	64.1%	33.3%	100.0%	61.5%	97.4%	48.7%	80.0%	**72.5%**
Industrial Consumer 5	92.7%	97.6%	46.3%	100.0%	43.9%	100.0%	85.4%	68.3%	**79.3%**
Industrial Consumer 6	95.1%	95.1%	90.2%	100.0%	100.0%	100.0%	68.3%	97.6%	**93.3%**
Industrial Consumer 7	-	-	-	-	-	-	-	-	**-**
Industrial Consumer 8	95.1%	82.9%	61.0%	100.0%	78.0%	95.1%	63.4%	92.7%	**83.5%**
Industrial Consumer 9	56.8%	89.2%	8.1%	83.8%	100.0%	100.0%	41.7%	47.4%	**65.9%**
Industrial Consumer 10	90.2%	73.2%	90.2%	100.0%	100.0%	82.9%	39.0%	100.0%	**84.5%**
Industrial Consumer 11	93.8%	12.5%	12.5%	93.8%	100.0%	100.0%	0.0%	43.8%	**57.0%**
2020/2021									
Industrial Consumer 1	25.0%	2.5%	15.0%	100.0%	77.5%	100.0%	2.5%	95.0%	**52.2%**
Industrial Consumer 2	95.5%	9.1%	0.0%	90.9%	95.5%	100.0%	4.5%	59.1%	**56.8%**
Industrial Consumer 3	100.0%	100.0%	100.0%	97.6%	100.0%	100.0%	95.2%	100.0%	**99.1%**
Industrial Consumer 4	97.6%	97.6%	75.6%	100.0%	82.9%	95.1%	87.8%	97.6%	**91.8%**
Industrial Consumer 5	73.8%	92.9%	40.5%	100.0%	47.6%	97.6%	66.7%	81.0%	**75.0%**
Industrial Consumer 6	90.5%	92.9%	97.6%	100.0%	97.6%	100.0%	82.9%	100.0%	**95.2%**
Industrial Consumer 7	-	-	-	-	-	-	-	-	**-**

Table C.8.6: Compliance percentages of industrial effluent discharged by industrial consumers per parameter for the various financial years									
Industrial Consumer	**pH**	**COD**	**EC**	**Caustic Alkalinity**	**Chloride**	**Settable Solids**	**Suspended Solids**	**TDS**	**Average Compliance**
Industrial Consumer 8	95.2%	97.6%	61.9%	97.6%	76.2%	100.0%	85.7%	90.5%	**88.1**%
Industrial Consumer 9	60.5%	86.8%	34.2%	100.0%	97.4%	100.0%	47.4%	68.4%	**74.3**%
Industrial Consumer 10	92.9%	76.2%	78.6%	95.2%	88.1%	83.3%	45.2%	95.2%	**81.8**%
Industrial Consumer 12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0**%
2019/2020									
Industrial Consumer 1	53.3%	26.7%	40.0%	93.3%	86.7%	95.6%	17.8%	88.9%	**62.8%**
Industrial Consumer 2	100.0%	0.0%	4.2%	79.2%	95.8%	100.0%	0.0%	12.5%	**49.0%**
Industrial Consumer 3	100.0%	100.0%	94.7%	100.0%	100.0%	100.0%	97.4%	94.7%	**98.4%**
Industrial Consumer 4	91.3%	84.8%	73.9%	100.0%	84.8%	97.8%	78.3%	95.7%	**88.3%**
Industrial Consumer 5	80.4%	100.0%	26.1%	100.0%	28.3%	100.0%	67.4%	56.5%	**69.8%**
Industrial Consumer 6	93.5%	60.9%	87.0%	97.8%	100.0%	82.6%	37.0%	97.8%	**82.1%**
Industrial Consumer 7	-	-	-	-	-	-	-	-	**-**
Industrial Consumer 8	97.8%	91.3%	67.4%	100.0%	78.3%	100.0%	80.4%	87.0%	**87.8%**
Industrial Consumer 9	25.0%	87.5%	18.8%	93.8%	96.9%	100.0%	37.5%	78.1%	**67.2%**
Industrial Consumer 10	97.8%	73.9%	97.8%	97.8%	95.7%	84.8%	28.3%	97.8%	**84.2%**
Industrial Consumer 12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
2018/2019									
Industrial Consumer 1	39.6%	29.2%	35.4%	97.9%	81.3%	100.0%	41.7%	93.8%	**64.8%**
Industrial Consumer 2	95.8%	12.5%	0.0%	70.8%	91.7%	100.0%	54.2%	4.2%	**53.6%**
Industrial Consumer 3	100.0%	98.0%	100.0%	100.0%	100.0%	100.0%	98.0%	100.0%	**99.5%**
Industrial Consumer 4	100.0%	91.7%	77.1%	100.0%	81.3%	100.0%	89.6%	97.9%	**92.2%**
Industrial Consumer 5	95.9%	98.0%	28.6%	100.0%	40.8%	98.0%	89.8%	65.3%	**77.0%**
Industrial Consumer 6	85.4%	44.9%	93.9%	100.0%	95.9%	95.9%	55.1%	100.0%	**83.9%**
Industrial Consumer 7	40.0%	100.0%	60.0%	100.0%	60.0%	100.0%	100.0%	100.0%	**82.5%**
Industrial Consumer 8	82.1%	97.4%	48.7%	100.0%	56.4%	100.0%	94.9%	87.2%	**83.3%**
Industrial Consumer 9	70.8%	95.8%	37.5%	100.0%	100.0%	100.0%	85.4%	97.9%	**85.9%**
Industrial Consumer 10	97.7%	70.5%	90.9%	100.0%	95.5%	90.9%	63.6%	97.7%	**88.4%**
Industrial Consumer 12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**

The graph below gives an overview of the overall average annual compliance of all the parameters sampled for the industrial consumers for the last six financial years.

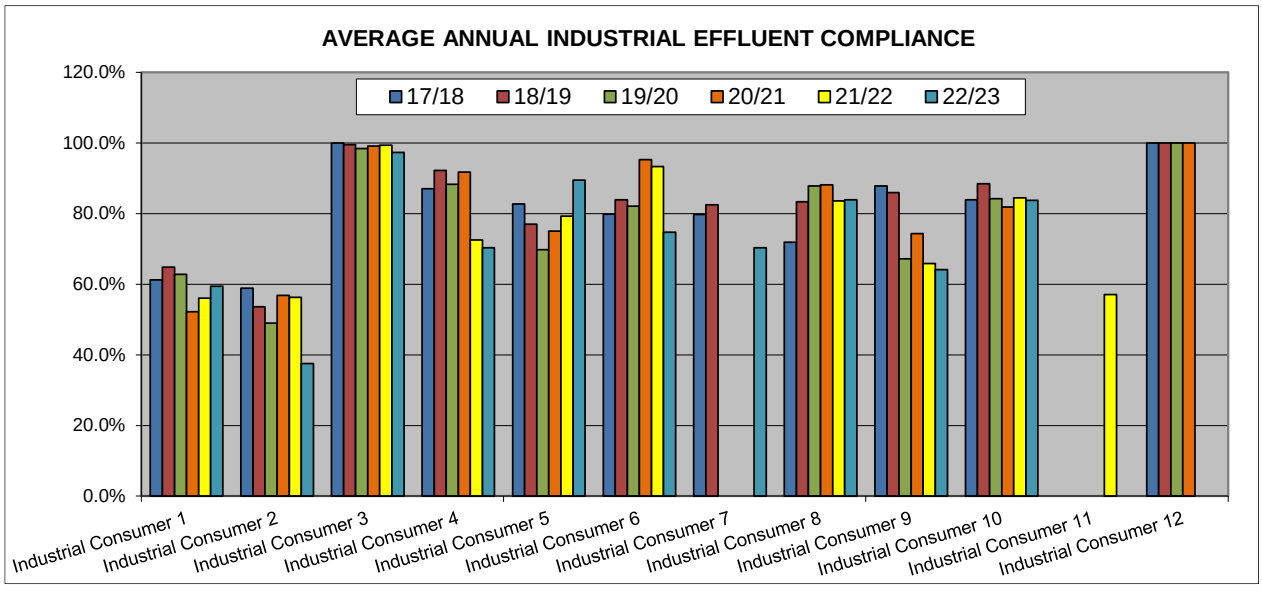


Figure C.8.2: Average annual industrial effluent compliance for the last six financial years

C.9. Water Services Institutional Arrangements and Customer Services

George Municipality is the official WSA for the entire Municipal Management Area and act as the WSP for the whole area.

George Municipality's WSDP was updated during the 2019/2020 financial year. The updated WSDP was compiled according to DWS's new WSDP website, which was rolled out to all the Municipalities in the Garden Route Region on the 23rd of October 2017. The final WSDP was approved by Council as one of the Sectoral Plans of the IDP.

The required Policies and Bylaws for water and sanitation provision are in place. The Municipality updated their Water Services By-laws during the last financial year. The updated Water Services By-laws went through a Public Participation Process, but still needs to be approved and promulgated. The Water Services By-laws cover the provision of services for water supply, sanitation and industrial effluent and are actively implemented by the Municipality.

George Municipality continues to undertake basic public awareness programmes. The education of users where sanitation facilities are upgraded to waterborne systems is on-going. This is primarily implemented during the low-income housing developments and informing users of the appropriate use of and routine maintenance of such facilities.

The Municipal personnel is continuously exposed to training opportunities, skills development and capacity building at a technical, operations and management level in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled every year and the specific training needs of the personnel, with regard to water and wastewater management are determined annually. The following water and sanitation services training was provided during the 2022/2023 financial year, as included in the Municipality's Workplace Skills Plan.

Table C.9.1: Training provided during the 2022/2023 financial year (Workplace Skills Plan)

Type of learning intervention	No Trained
NC: Water and Wastewater treatment process operations NQF 2	6

All the WTWs and WWTWs in George Municipality's Management Area and the Process Controllers working at these plants are registered on the IRIS of the DWS. The staff composition for Water Services for the last three financial years, as taken from the Annual Reports, is indicated in the table below.

Table C.9.2: Staff composition for Water Services for the last three financial years

Job Level	2022/2023				2021/2022				2020/2021			
	Budgeted Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)	Budgeted Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)	Budgeted Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)
	No.	No.	No.	%	No.	No.	No.	%	No.	No.	No.	%
0 – 3	1	1	0	0%	1	1	0	0%	1	1	0	0%
4 – 6	74	60	14	19%	67	60	7	10%	72	54	18	25%
7 – 9	22	19	3	14%	19	15	4	21%	19	17	3	16%
10 – 12	30	24	6	20%	26	22	4	15%	26	21	5	19%
13 – 15	1	1	0	0%	1	1	0	0%	1	0	1	100%
16 – 18	1	1	0	0%	1	0	1	100%	1	0	1	100%
19 - 20	0	0	0	0%	0	0	0	0%	0	0	0	0%
Total	**129**	**106**	**23**	**18%**	**115**	**99**	**16**	**14%**	**120**	**93**	**28**	**23%**

The staff composition for Waste Water Services for the last three financial years, as taken from the Annual Reports, is indicated in the table below.

Table C.9.3: Staff composition for Waste Water Services for the last three financial years

Job Level	2022/2023				2021/2022				2020/2021			
	Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)	Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)	Posts	Employees	Vacancies	Vacancies (as a % of budgeted posts)
	No.	No.	No.	%	No.	No.	No.	%	No.	No.	No.	%
0 – 3	0	0	0	0%	1	1	0	0%	1	1	0	0%
4 – 6	31	24	7	23%	36	29	7	19%	36	32	4	11%
7 – 9	17	12	5	29%	21	17	4	19%	21	18	3	14%
10 – 12	6	6	0	0%	5	4	1	20%	5	3	2	40%
13 – 15	0	0	0	0%	1	0	1	100%	1	1	0	0%
16 – 18	1	1	0	0%	0	0	0	0%	0	0	0	0%
19 - 20	0	0	0	0%	0	0	0	0%	0	0	0	0%
Total	**55**	**41**	**12**	**22%**	**64**	**51**	**13**	**20%**	**64**	**55**	**9**	**14%**

The Occupational Health and Safety Act contain provisions directing employers to maintain a safe workplace and to minimize the exposure of employees and the public to workplace hazards. It is therefore important for George Municipality to compile a Legal Compliance Audit of all their WTWs and WWTWs, which will provide the management of George Municipality with the necessary information to establish whether the Municipality is in compliance with the legislation or not.

George Municipality's Organogram, which include water and sanitation services, is included in Annexure E (September 2022). George Municipality is currently effectively managing its water and sanitation services. Urgent attention is however required to address the backlog in infrastructure rehabilitation and maintenance. The Municipality needs to continue to use the updated Water and Sewer Master Plans to guide all future water and sewerage infrastructure planning.

Municipal Strategic Self-Assessment (MuSSA): Overseen by the DWS the MuSSA conveys an overall business health of municipal water business and serves as a key source of information around municipal performance. The MuSSA also identifies key municipal vulnerabilities that are strategically important to DWS, the Department of Cooperative Government (DCoG), National Treasury, the planning Commission/Office of the Presidency, the South African Local Government Association (SALGA) and the municipalities themselves. The MuSSA team continues to engage (1) DWS directorates and their associated programmes (e.g. Water Services Development Plan, Water Services Regulation), and (2) other sector departments and their associated programmes (e.g. LGTAS, MISA) to minimize duplication and ensure alignment. Through the tracking of current and likely future performance, the key areas of vulnerability identified, allow municipalities to effectively plan and direct appropriate resources that will also enable DWS and the sector to provide more effective support.

The Spider Diagram below effectively indicates the vulnerability levels of George Municipality across the eighteen key service areas, as identified through the Municipal Strategic Self-Assessment of Water Services process.

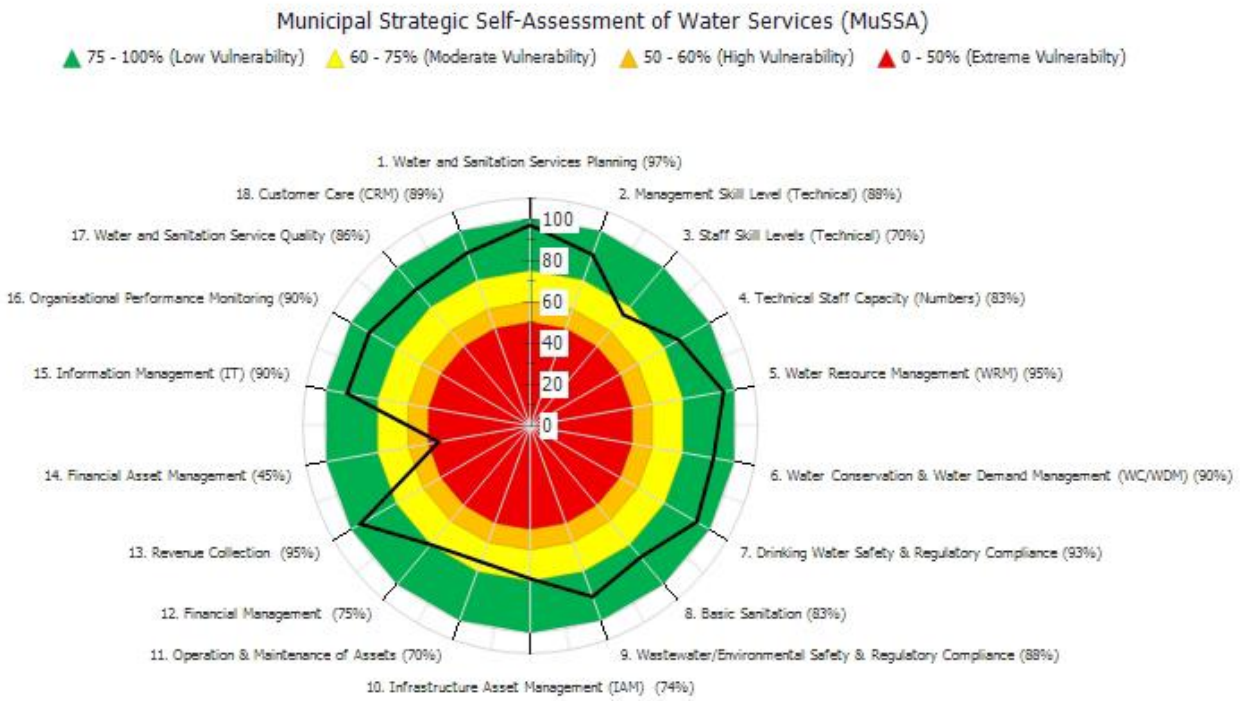


Figure C.9.1: Spider Diagram of the vulnerability levels of George Municipality for 2023

George Municipality's Vulnerability Index for 2023 was indicated as 0.26 "Moderate Vulnerability". The only area of concern evident from the 2023 assessment was Financial Asset Management (Extreme Vulnerability).

Table C.9.4: Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality

Section	Vulnerability
Water and Sanitation Service Quality • Critical business databases and documents (e.g. as-built drawings, records, manuals, agreements, billing/revenue collection, project and scheme management data, etc.) are current, maintained and stored in secure locations (on-site and off-site, both paper and electronic). • Customers have a functional, reliable and safe water supply system with sufficient quantity and flow, good quality and minimal interruptions. • All consumers served experience interruptions of less than 48 hours (at any given time) and a cumulative interruption time during the year of less than 15 days. • Households in your WSA experience water pressure problems (no flow/partial flow less than 10 litres / minute) (not to be confused with interruption to supply). • Customers have a functional, reliable, dignified and safe sanitation system with no blockages resulting in overflows that impact on the environment, including effective collection and treatment of faecal sludge.	**Low (86.0%)**
Customer Care • A functional customer service system manned by appropriate customer services representatives and using a complaints register, is in place to address complaints and appropriately inform customers of service interruptions, contamination of water, boil water alert, etc. • Regular municipal wide customer satisfaction surveys are conducted to determine customer satisfaction levels and inform the Customer Care Management Plan. • Please indicate what percentage of the reported water related complaints/callouts are acknowledged, including consumer response, within 24 hours. • Please indicate what percentage of the reported wastewater/sanitation related complaints/callouts are	**Low (89.0%)**

Table C.9.4: Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality	
Section	**Vulnerability**
acknowledged, including consumer response, within 24 hours. • A comprehensive customer awareness programme (informing customers of water and wastewater system O&M activities, water quality, resource protection / pollution, reporting incidents / security concerns, etc.) is in place and implemented.	
Water and Sanitation Services Planning • Your appropriate water and sanitation services planning (e.g. WSDP) and associated master planning processes include and are aligned with appropriate Water and Sewage Master Plans, Spatial Development Framework, Water Safety Plans and Wastewater Risk Abatement Plans (W_2RAPs), and are aligned to your IDP and associated SDBIP targets. • You are implementing an up-to-date and adopted municipal water and sanitation services plan (e.g. WSDP). • Your current project list addresses existing needs / shortcomings identified through the WSDP and associated master planning process. • Project progress is monitored, tracked and reported to municipal top management / council and the Regulator (through the annual water and sanitation services report). • Projects identified through your various planning processes have been implemented in the last 3 years.	**Low (97.0%)**
Water Resource Management (WRM) • The recommendations and actions from the Reconciliation Strategies (Large Systems / All Towns) have been incorporated into your WSDP, master planning and IDP processes. • The metered quantity of water available from the resources is sufficient for your future WSA needs (at the stipulated level of abstraction and assurance of supply, and considering possible climate change impacts) (i.e. no shortage in 10 years). • The quantity of water available from the resources is sufficient for your future WSA needs (at the stipulated level of assurance of supply) (i.e. no shortage in 10 years). • The source water quality is currently acceptable for its purpose. • The trend indicates a deteriorating source water quality.	**Low (95.0%)**
WC/WDM • Your WSA has developed a council approved WC/WDM Strategy, which includes a standard water balance (e.g. modified IWA). • Please indicate your percentage Non-Revenue Water (NRW) as per the modified IWA water balance. • System input volumes (bulk) to the WSA are accurately monitored using calibrated bulk meters (e.g. check metering). • Please indicate what percentage of all connections are metered and billed (residential and non-residential (commercial, industrial, etc.)) on a monthly basis. • Your WSA is implementing appropriate intervention programmes to reduce NRW (e.g. minimisation of night flows through pressure management, removal of unlawful connections, leak detection and repairs, consumer education / awareness).	**Low (90.0%)**
Drinking Water Safety and Regulatory Compliance • Please indicate your microbiological drinking- water quality compliance for E.Coli (or faecal coliforms) for the communities you are monitoring for the last 12 months. • ALL your supply schemes, WTWs, process controllers, monitoring programmes, sample points, laboratories, results, procedures, protocols, etc. are managed with a suitable Water Safety Planning framework. • Council have been made aware of high risk / critical water safety plan related issues (including those identified via the Blue Drop Certification programme) that require budget and auctioning, and these issues have been actioned (where applicable). • Sufficient funds have been made available to address all these identified water safety related issues. • Required corrective actions/remedial measures to address all these identified water safety related issues have been successfully implemented.	**Low (93.0%)**
Basic Sanitation • You have formal housing areas that are not fully serviced with sanitation infrastructure. • You have informal housing or rural areas that are not fully serviced with sanitation infrastructure. • You have a detailed plan and programme to provide safe sanitation to all households (including health and hygiene education and user awareness including Water, Sanitation and Health (WASH) aspects). • Your sanitation budget is appropriate for required sanitation programmes (implementation and O&M).	**Low (83.0%)**

Table C.9.4: Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality	
Section	**Vulnerability**
• You are servicing your basic sanitation facilities (e.g. pit latrines) as per safe sanitation requirements (healthy, environmentally safe, structurally sound, regularly maintained, following faecal sludge management best practices).	
Wastewater / Environmental Safety and Regulatory Compliance • Please indicate your treated wastewater effluent compliance for COD for your (or your service provider's) WWTWs for the last 12 months. • ALL your WWTWs, process controllers, monitoring programmes, sample points, laboratories, results, procedures, protocols, etc. are managed with a suitable waste water risk abatement framework. • Council have been made aware of all W_2RAP related issues (e.g. pollution incidents, Green Drop deficiencies) that require budget and auctioning, and these issues have been actioned (where applicable). • Sufficient funds have been made available to address all identified wastewater and environmental safety related issues. • Required corrective actions/remedial measures to address all identified wastewater and environmental safety related issues have been successfully implemented.	**Low (88.0%)**
Infrastructure Asset Management • You have an appropriate and up-to-date water and sanitation services technical Asset Register (includes asset name, location, condition, extent, remaining useful life, performance and risk). NOTE: This does only not refer to GRAP17 asset register requirements. • You have developed an appropriate Infrastructure Asset Management (IAM) Plan for your WSA. • You are implementing the IAM outcomes. • Budget allocated to implement IAM outcomes is sufficient and is being effectively spent. • You conduct annual technical assessments of your water and wastewater related systems (including sources, WTWs, WWTWs, pump stations, network, etc.) and implement required follow-up actions.	**Moderate (74.0%)**
Operation and Maintenance of Assets • Appropriate maintenance facility(ies) that is (are) secure and stocked with essential equipment (e.g. spare parts), plant and tools is (are) available. • Appropriate water and sanitation services infrastructure / equipment planned / preventative maintenance schedules are developed. • Appropriate planned / preventative maintenance is performed at all WTWs and associated reservoirs, pump stations and distribution networks. • Appropriate planned / preventative maintenance is performed at all WWTWs and associated collection systems and pump stations. • Please indicate your infrastructure repairs and maintenance costs as a function of total operating expenditure (%).	**Moderate (70.0%)**
Information Management • You have a developed, approved and implemented IT Master Systems Plan (e.g. covering 3-5 years) that addresses your IT business requirements. • You have a developed, approved and implemented ICT Technology Master Plan that addresses your current and future IT infrastructure requirements. • You have IT systems that support your full range of water and sanitation services business requirements (e.g. billing, GIS, customer care, O&M, asset management). • ICT service continuity – Adequate IT security exists with off-site back-ups / archiving of operation critical applications, databases, data, etc. routinely performed in terms of an IT disaster Recovery Plan. • You have sufficient budget and staff to keep key IT systems table and up-to-date as per IT policies and procedures.	**Low (90.0%)**
Organisational Performance Monitoring • Appropriate plans, policies and procedures to address Disaster Management / emergencies and other issues (safety, public participation, communication, etc.) are developed and implemented. NOTE: Although Disaster Management is a district function, LMs need to ensure they are aware of their associated roles and responsibilities and have developed a Disaster Management Framework. • An organisational performance management system is developed and implemented (i.e. effectively measure, monitor and track water and sanitation services performance indicators). • A municipal risk management framework is developed and implemented and includes monitoring and tracking of water and sanitation related risks.	**Low (90.0%)**

Table C.9.4: Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality	
Section	**Vulnerability**
• Effective administration support is available to technical staff to assist with processing work orders, providing order numbers, handling correspondence, etc. • "Access to Basic Water and Sanitation Services" progress reports are frequently produced and presented to council for discussion, action and follow-up.	
Financial Management • Financial controls - Please state the audit opinion with regard to your last audit report on the financial statements. • Cash flow status – Please state your Cash / Cost Coverage Ratio (excluding Unspent Conditional Grants) • Your actual operating expenditure closely reflects your budgeted operating expenditure (i.e. Operating Expenditure Budget Implementation Indicator). • Your actual revenue closely reflects your budgeted operating revenue (i.e. Operating Revenue Budget Implementation Indicator). • Liabilities (Creditors) - Money is owed by your municipality to major / critical service providers (e.g. ESKOM, Water Board, largest contractors, etc.) for more than 30 days from receipt of invoice (NOTE: Ignore disputed invoices).	**Low (75.0%)**
Revenue Collection • Please indicate the frequency of actual consumer meter readings. • Net Surplus / Deficit – Please state your net surplus / deficit from water services activities for the last 12 months (NOTE: This question tests whether your WSA currently has fully cost reflective Water and Sanitation Tariffs, which take into account cost of maintenance and renewal of purification plants and networks and the cost of new infrastructure). • Revenue collections - Please state the revenue collection rate in respect to Water and Sanitation Services (%). • Revenue Growth – Please state your Water and Sanitation Services revenue growth for the last 12 months (%). • Grant dependency – Actual-operating revenue less operational grants / subsidies (e.g. equitable share) sufficiently covers actual operating expenditure.	**Low (95.0%)**
Financial Asset Management • Capital Expenditure (Municipal). Please state your municipal Capital Expenditure as a percentage of Total Expenditure (i.e. Total Operating Expenditure + Capital Expenditure). • Capital Expenditure (Water Services). Please state your Capital Expenditure on Water and Sanitation Services as a percentage of Total Capital Expenditure (Capital Expenditure (Municipal)). • Asset Renewal. Please state your Asset Renewal investment as percentage of Depreciation Costs. • Repairs and Maintenance. Please state your Repairs and Maintenance expenditure as a percentage of Property, Plant and Equipment, Investment Property (Carrying Value). • Grant funding of capital expenditure – Please state your reliance on grant funding.	**Extreme (45.0%)**
Management Skill Level (Technical) • Your council approved technical management organisational organogram meets your business requirements, and key posts are filled (e.g. Technical Director, Water Services Manager, and Sanitation Services Manager). • You have sufficient technical management and technical support staff. • Technical management and technical support staff have the correct skills / qualifications and experience as per Job Description requirements (e.g. if Job Description requires Pr Eng, Pr Tech or CPM, the staff have these qualifications). • Managers and technical support staff regularly attend appropriate water and sanitation services skills development / training to support professionalisation. • Key technical managers (e.g. Section 56 and other Senior Management) have signed and monitored Performance Agreements.	**Low (88.0%)**
Staff Skill Levels (Technical) • WTWs are operated by staff with the correct skills / qualifications and experience (as per Regulation 2834). • WWTWs are operated by staff with the correct skills / qualifications and experience (as per Regulation 2834). • Water system plumbers, mechanics and electricians have the correct skills / qualifications and experience. • Sewage system plumbers, millwrights, mechanics and electricians have the correct skills/qualifications and experience (including contractors / outsourced resources). • Staff regularly attend appropriate water services skills development / training (including safety) (e.g. ESETA courses).	**Moderate (70.0%)**

Table C.9.4: Municipal Strategic Self-Assessment (MuSSA) of Water Services for George Municipality	
Section	**Vulnerability**
Technical Staff Capacity (Numbers) • Your council approved technical staff organisational organogram meets your business requirements, and posts are filled (i.e. Superintendent of WTWs / WWTWs and below). • WTWs are operated by the appropriate number of staff (as per Regulation 2834). • WWTWs are operated by the appropriate number of staff (as per Regulation 2834). • You have sufficient water and sewerage/sanitation network operations and repair staff/plumbers including contractors / outsourced resources (i.e. you have the appropriate number of staff). • An active mentoring/shadowing programme is in place where experienced staff train younger, inexperienced municipal staff.	**Low (83.0%)**

A comprehensive Customer Services and Complaints system is in place at George Municipality and the Municipality has maintained a high and a very consistent level of service to its urban water consumers. After hour emergency requests are being dealt with by the control room on a twenty-four-hour per day basis. Requests are furthermore captured on an electronic mail or works-order system to ensure execution thereof.

The graph below gives an overview of the number of water complaints received for the various financial years. The following activities are included under complaints (22/23 figures):

- Water connection leaks (2 091)
- Stopcock leaks, replacements and damage (354)
- Valves damaged, stolen and faulty (445);
- Fire hydrants (101),
- Standpipes (23), and
- Main line leaks (395).

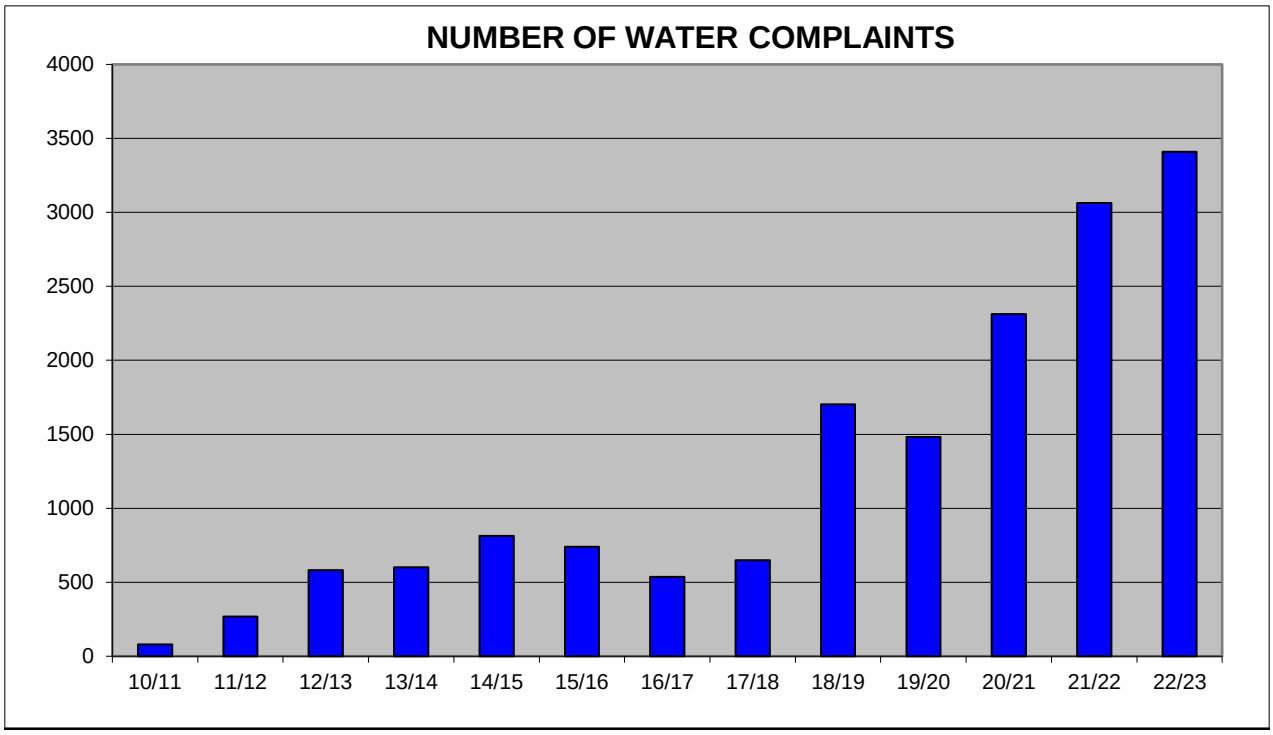


Figure C.8.2: Number of water related complaints received from the public per financial year.

Access to safe drinking water is essential to health and is a human right. Safe drinking water that complies with the SANS:241 Drinking Water specifications do not pose a significant risk to health over a lifetime of

consumption, including different sensitivities that may occur between life stages. George Municipality is therefore committed to ensure that their water quality always complies with national safety standards.

The Water Safety Plans of George Municipality were updated during the 2021/2022 financial year. The Water Safety Plans include an Improvement / Upgrade Plans. The purpose of the Improvement / Upgrade Plan is to address the existing significant risks where the existing controls were not effective or absent. Barriers implemented by George Municipality against contamination and deteriorating water quality include the following:

- Participate in Catchment management and water resource protection initiatives.
- Protection at points of abstraction such as river intakes and dams (Abstraction Management).
- Correct operation and maintenance of WTWs (Coagulation, flocculation, sedimentation and filtration).
- Protection and maintenance of the distribution systems. This includes ensuring an adequate disinfectant residual at all times, rapid response to pipe bursts and other leaks, regular cleaning of reservoirs, keeping all delivery points tidy and clean, etc.

Three other important barriers implemented by George Municipality against poor quality drinking water that are a prerequisite to those listed above are as follows:

- A well-informed Council and municipal managers that understand the extreme importance of and are committed to providing adequate resources for continuous professional operation and maintenance of the water supply system.
- Competent managers and supervisors in the technical department who are responsible for water supply services lead by example and are passionate about monitoring and safeguarding drinking water quality.
- Well informed community members and other consumers of water supply services that have respect for water as a precious resource.

D. APPROVAL AND PUBLICATION RECORD

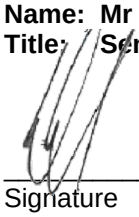
This Annual WSDP Performance- and Water Services Audit Report is for the 2022/2023 Financial Year and is hereby approved for submission to the Minister of the Department of Water and Sanitation, the Minister for the Department of Cooperative Governance, the Western Cape Province and to SALGA, as required by the Water Services Act, 1997. The Municipality will endeavour to publicise a summary of the report.

This report will be available for inspection at the offices of the municipality and is available on the Municipality's website. A Copy of the report is obtainable at a fee as determined by the Municipality.

RECOMMENDED:

Signature — Date: 16 October 2023

Name: Mr Fabian Abrahams
Title: Senior Engineering Technician



Signature — Date: 16 October 2023

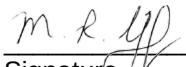
Name: Mr Deon De Jager
Title: Deputy Director: Water and Sanitation

L Daniels
Acting Director: Civil Engineering Services

Signature — Date: 25 Oct 2023

Name: Mr Jannie Koegelenberg
Title: Director: Civil Engineering Services

APPROVED:



26/10/2023

Signature — Date

Name: Dr Michele Gratz
Title: Municipal Manager

REFERENCES

- SA Census Data (2011), Community Profiles.
- Water Services Act, Act 108 of 1997. Regulations under Section 9 of the Water Services Act, which include the water services audit as Section 10 of the Guidelines for Compulsory National Standards.
- DWS's Annual Water Services Development Plan Performance- and Water Services Audit Report Template, August 2014.
- DWS's 2014 Blue Drop Report and 2022 Blue Drop PAT Results.
- DWS's 2022 Green Drop Report.
- DWS's 2014 Green Drop Progress Report.
- DWS's All Towns Reconciliation Strategy Documents for each of the towns in George Municipality's Management Area, 2015.
- Municipal Services Strategic Assessment (MuSSA) for George Municipality, 2023, DWS.
- George Municipality's Annual WSDP Performance- and Water Services Audit Report for 2021/2022, iX engineers.
- George Municipality's Operational and Maintenance Budgets and Tariffs for 2022/2023.
- Asset Register for Water and Sewerage Infrastructure Assets, June 2023.
- SDBIP of George Municipality for 2022/2023.
- George Municipality's Annual Reports.
- 2022 Socio Economic Profile for George Municipality, Western Cape Government

ATTENDANCE REGISTER (DISCUSSION OF DRAFT REPORT)

iX engineers
Infrastructure Excellence

ATTENDANCE REGISTER

Meeting Subject	George Water Services Audit		
Location Of Meeting	George Municipality – Engineering Department	**Document No**	
Chaired By	J Human	**Date of Meeting**	16 October 2023
Recorded By	iX engineers	**Time Start**	14:00
		Time Finish	15:30

Attended by:

Representative	Name of Firm	Postal Address	Contact Details				Signature
1. T. RAIMAN	G.M	—	Tel No	—	E-mail	TRAIMAN@GEORGE.GOV.ZA	
			Cell No	061 585 7320	Fax No		
2. G. BREDENKAMP	GEORGE MUN.	—	Tel No	—	E-mail	gbredenkamp@george.gov.za	
			Cell No	0796927147	Fax No		
3. F. ABRAHAMS	GEORGE MUN.	—	Tel No	0834524805	E-mail	fabrahams@george.gov.za	
			Cell No		Fax No		
4. Dole Jager	GM		Tel No		E-mail	dolejager@george.gov.za.	
			Cell No	0834536788	Fax No		

iX engineers
Infrastructure Excellence

Representative	Name of Firm	Postal Address	Contact Details				Signature
5. J HUMAN	iX ENGINEERS	PO BOX 398 BELLVILLE	Tel No	021-912 3000	E-mail	jaco.h@ixengineers.co.za	
			Cell No	0844318728	Fax No		
6. M ADONIS	DWS		Tel No		E-mail	AdonisM@dws.gov.za	VIRTUAL ATTENDANCE
			Cell No		Fax No		
7. S MALAGANA	DWS		Tel No		E-mail	MagaganaS@dws.gov.za	VIRTUAL ATTENDANCE
			Cell No		Fax No		
8.			Tel No		E-mail		
			Cell No		Fax No		
9.			Tel No		E-mail		
			Cell No		Fax No		
10.			Tel No		E-mail		
			Cell No		Fax No		
11.			Tel No		E-mail		
			Cell No		Fax No		

ANNEXURE A

IWA Water balances for the various distribution systems
Rainfall and WWTW's flows and capacities
WTW's flows and capacities
Billed metered consumption and number of consumer units
Water usage per sector for the George / Wilderness system

ANNEXURE B

DWS's No Drop Spreadsheet

ILI for the various distribution systems

DWS's scorecard for assessing the potential for WC/WDM efforts

ANNEXURE C

Future Water Requirement Projections for the Various Distribution Systems

ANNEXURE D

Water Quality Compliance Sample Results
Final Effluent Quality Compliance Sample Results
Industrial Effluent Quality Sample Results

ANNEXURE E

Organisational Structure: Civil Engineering Services Directorate

BILLED METERED CONSUMPTION

Category	Code	2005/2006 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Household I	1401	304042	323908	325351	369947	306275	368596	396904	502150	403724	342377	342072	353859	**4339205**
Business I	1402	88243	96026	84395	92362	87256	118362	105017	102757	95273	97943	112906	125925	**1206465**
Sport Bodies	1403	1939	1545	3588	3224	4185	3667	5759	3143	3103	2770	5433	6312	**44668**
Industrial	1404	35060	37089	31756	41578	50736	28925	31411	38648	45763	47389	31088	45606	**465049**
Household N	1406	0	15	12	11	4	0	6	28	0	0	9	1	**86**
Saasveld 3	1410	8522	8777	6176	9150	7705	8662	4678	3730	3886	4126	13388	7017	**85817**
Buitestedel	1413	7198	6123	6625	6559	5938	12674	8589	10148	9470	7249	8497	7780	**96850**
Old Age K-Hu	1414	2429	2061	2538	2639	2225	2966	2613	2853	3450	1843	1939	2345	**29901**
Governm./Sc	1415	31893	32062	30867	32095	33790	39411	29771	40311	35968	22751	22418	22656	**373993**
Service Org	1417	5217	4772	4619	5137	4933	4721	4550	5658	5329	2524	3030	2743	**53233**
Municipal Dep.	1418	24508	15038	15431	16906	16225	14412	15686	7718	12874	15283	17233	12861	**184175**
Bulk Other	1419	1441	1853	1243	1718	1665	1848	1240	2076	1931	3071	3001	3072	**24159**
Herolds Bay	1422	5828	6699	6930	7395	6883	8531	8192	11501	8246	6254	6515	6678	**89652**
Apartment B	Blok	12052	12362	11811	14540	12204	14535	13818	18689	15444	13827	13948	14821	**168051**
TOTALS		**528372**	**548330**	**531342**	**603261**	**540024**	**627310**	**628234**	**749410**	**644461**	**567407**	**581477**	**611676**	**7161304**

Category	Code	2006/2007 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Household I	1401	340579.3	352668.66	343157	368623	357551	358125	439391	481852	460289	389382	429808	402415	**4723841**
Business I	1402	103374	105390	119664	127998	134303	127438	150983	162334	148969	115494	151256	120395	**1567598**
Sport Bodies	1403	2874	2947	1441	1702	3002	2630	4561	7565	7222	2919	2659	1821	**41343**
Industrial	1404	38675	42493	47639	29448	37340	27752	37314	46410	34878	51088	55075	52129	**500241**
Household N	1406	0	0	1	1	0	3	25	23	0	0	0	3	**56**
Saasveld 3	1410	2162	8304	6073	9760	4418	2368	3703						**36788**
Buitestedel	1413	6276	8360	8481	7268	4835	7125	6005	7245	6904	7319	8182	6728	**84728**
Old Age K-Hu	1414	2265	1884	2921	3065	3012	3071	2552	2816	3220	2812	2863	3349	**33830**
Governm./Sc	1415	17631	20134	21555	21935	23805	16987	18927	29311	30224	30211	33859	27883	**292462**
Service Org	1417	2496	2054	2522	2808	4042	3563	4154	4542	4544	4302	4303	4164	**43494**
Municipal Dep.	1418	11505	10841	6118	16994	13924	12460	18851	19951	16328	15104	13486	6129	**161691**
Bulk Other	1419	3348	3400	3273	3787	2264	2178	2379	2780	3136	2908	2608	2857	**34918**
Herolds Bay	1422	5874	5924	5207	5728	5993	6217	7482	9122	7907	6752	6962	6778	**79946**
Apartment B	Blok	13900	14391	14004	14357	14840	15622	17988	22275	20343	15795	19851	16198	**199564**
TOTALS		**550959.3**	**578790.66**	**582056**	**613474**	**609329**	**585539**	**714315**	**796226**	**743964**	**644086**	**730912**	**650849**	**7800500**

Category	Code	2007/2008 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Household I	1401	383499	400261	393874	437948	398677	439899	458744	370643	424547	423460	402139	401634	**4935325**
Business I	1402	124249	132373	126040	150671	128172	131475	128995	108942	131036	122826	133664	101927	**1520370**
Sport Bodies	1403	2633	2321	2802	4155	3573	3799	2313	3097	3056	3098	3444	2582	**36873**
Industrial	1404	51614	44295	48586	32739	26585	26072	32594	38969	29165	35654	37656	47401	**451330**
Household N	1406	0	11	4	1	0	0	9	17	0	3	7	3	**55**
Buitestedel	1413	7615	6571	6504	6353	6442	6332	9767	7990	5879	6434	6168	6267	**82322**
Old Age K-Hu	1414	2893	2776	3184	3160	2972	3369	3258	2864	2807	2876	2755	3207	**36121**
Governm./Sc	1415	22184	25623	38309	33883	37141	31177	21000	24800	28756	28554	30532	28915	**350874**
Service Org	1417	4677	4369	3249	4908	4114	4158	4359	3028	3589	4596	4149	4101	**49297**
Municipal Dep.	1418	8678	21907	8662	14258	8948	22464	23346	39788	21759	12322	17172	14687	**213991**
Bulk Other	1419	2645	2725	2741	3373	2553	3100	2838	2126	2949	2763	2695	2653	**33161**
Herolds Bay	1422	6403	6011	7741	7590	7347	6614	9541	5991	7431	7089	6442	7308	**85508**
Apartment B	Blok	15340	17669	15945	16194	15524	15719	17035	16385	16228	15845	15928	16185	**193997**
TOTALS		**632430**	**666912**	**657641**	**715233**	**642048**	**694178**	**713799.132**	**624639.577**	**677202**	**665520**	**662751**	**636870**	**7989223.709**

Category	Code	2008/2009 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Household I	1401	408794	399197	436062	437353	375677	420109	390354	673208	433658	434743	440868	465000	**5315023**
Business I	1402	107580	116054	104403	215794	113505	108756	99657	136073	103809	118534	109016	104041	**1437222**
Sport Bodies	1403	2188	2860	2381	2470	2124	3825	3242	6369	4807	4682	4840	3290	**43078**
Industrial	1404	38539	36725	40347	44342	49873	60801	43932	55718	44330	60150	46587	59243	**580587**
Household N	1406	1	0	0	0	30	0	14	27	1	0	5	5	**83**
Buitestedel	1413	3819	4533	4640	4185	6113	6038	5744	9358	8780	7656	6717	5570	**73153**
Old Age K-Hu	1414	2996	2534	3015	3209	2727	3042	2287	3113	3042	2883	2751	2893	**34492**
Governm./Sc	1415	24018	36426	38584	33070	24237	28215	25966	35846	31783	33797	32087	32693	**376722**
Service Org	1417	4375	3705	5409	4444	4453	4364	3192	5455	3666	3544	4088	3823	**50518**
Municipal Dep.	1418	6311	8687	7178	6672	8385	7252	8603	10655	7642	8848	8060	7630	**95923**
Bulk Other	1419	2930	2892	2902	2646	2249	2545	2340	3791	2882	3144	2974	2980	**34275**
Herolds Bay	1422	6509	7129	6457	6776	6759	8122	5809	14481	8261	7145	7945	7798	**93191**
Apartment B	Blok	15831	15434	15195	13760	13443	15049	14270	22353	15142	15917	15910	14354	**186658**
TOTALS		**623891**	**636176**	**666573**	**774721**	**609575**	**668118**	**605410**	**976447**	**667803**	**701043**	**681848.264**	**709320**	**8320925**

Category	Code	2009/2010 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Indigent (Masakhane)	1400								119952	129057	109197	113378	103037	**574622**
Household I	1401	405934	405916	395256	387037	342718	332676	339469	223722	204378	175065	189778	166631	**3568580**
Business I	1402	96898	94533	95886	98091	86967	99124	98006	94365	87443	91795	86086	75666	**1104860**
Sport Bodies	1403	3633	2479	2353	2454	2222	2487	2297	2242	2130	2157	1926	1416	**27796**
Industrial	1404	53436	54165	63087	59529	68930	51234	41551	52133	42896	34604	43662	40306	**605533**
Household N	1406	2	0	0	5	1	5	14	12	11	4	8	8	**70**
Buitestedel	1413	5221	4510	4746	3280	3282	3424	3695	3183	3655	3956	4631	3912	**47495**
Old Age K-Hu	1414	2931	2584	2808	2757	2175	2276	1787	2310	2963	2599	2600	2765	**30555**
Governm./Sc	1415	27091	23926	29133	25421	21880	19713	15475	17852	18439	17415	19833	17352	**253530**
Service Org	1417	3538	3504	3674	3427	3532	3709	4037	4327	4769	4483	3041	2914	**44955**
Municipal Dep.	1418	6693	5072	4959	4206	5142	5692	5148	3791	4001	5289	4254	7042	**61289**
Bulk Other	1419	3516	4022	3361	3476	2958	2846	2891	2853	3007	3123	2848	3115	**38016**
Herolds Bay	1422	5884	6665	5927	6613	4807	4999	4979	4641	4591	4359	4003	3458	**60926**
Apartment B	Blok	13448	13144	14519	14576	12837	13535	13109	15718	14152	12062	12638	10827	**160565**
TOTALS		**628225**	**620520**	**625709**	**610872**	**557451**	**541720**	**532458**	**547101**	**521492**	**466108**	**488686**	**438449**	**6578792**

NUMBER OF CONSUMERS

Category	Code	2005/2006 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	AVERAGE
Household I	1401	21120	21452	22042	22244	22608	23112	23180	23476	23602	23647	23706	23940	**22844**
Business I	1402	1172	1192	1204	1204	1207	1211	1219	1222	1226	1264	1272	1282	**1223**
Sport Bodies	1403	13	13	13	13	18	18	18	18	18	19	17	17	**16**
Industrial	1404	16	17	17	17	17	17	17	18	18	18	17	17	**17**
Household N	1406	17	19	19	20	20	20	20	21	21	21	21	21	**20**
Saasveld 3	1410	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Buitestedel	1413	27	27	27	27	27	28	28	29	29	29	29	29	**28**
Old Age K-Hu	1414	9	9	9	9	9	10	10	10	10	6	6	6	**9**
Governm./Sc	1415	84	84	85	86	86	87	87	90	90	74	74	75	**84**
Service Org	1417	80	80	81	81	81	81	82	82	83	25	25	25	**67**
Municipal Dep.	1418	83	77	77	81	77	77	75	75	76	71	72	73	**76**
Bulk Other	1419	27	27	25	28	28	28	27	27	27	87	87	87	**42**
Herolds Bay	1422	110	109	108	108	107	107	105	105	104	103	103	103	**106**
Apartment B	Blok	76	76	78	78	78	78	79	79	80	80	80	80	**79**
TOTALS		**22835**	**23183**	**23786**	**23997**	**24364**	**24875**	**24948**	**25253**	**25385**	**25445**	**25510**	**25756**	**24611**

Category	Code	2006/2007 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	AVERAGE
Household I	1401	24034	24130	24254	24298	24364	24428	24487	24541	24895	24939	24991	25076	**24536**
Business I	1402	1289	1298	1296	1298	1291	1296	1307	1309	1319	1321	1349	1355	**1311**
Sport Bodies	1403	17	17	17	17	17	17	17	17	20	20	20	21	**18**
Industrial	1404	17	17	17	18	18	18	18	18	18	18	18	18	**18**
Household N	1406	21	21	23	22	21	21	21	21	21	21	21	21	**21**
Saasveld 3	1410	1	1	1	1	1	1	1						**1**
Buitestedel	1413	30	30	29	29	29	29	28	28	28	28	28	28	**29**
Old Age K-Hu	1414	6	6	16	16	16	16	16	16	16	16	16	16	**14**
Governm./Sc	1415	75	75	76	76	75	76	76	77	77	77	76	76	**76**
Service Org	1417	25	25	25	25	26	26	26	26	26	26	26	26	**26**
Municipal Dep.	1418	74	75	75	74	74	74	74	72	70	70	71	71	**73**
Bulk Other	1419	87	87	87	87	88	88	88	89	89	89	90	90	**88**
Herolds Bay	1422	103	103	103	103	103	102	102	102	102	102	101	101	**102**
Apartment B	Blok	80	80	82	83	85	87	87	87	87	86	87	86	**85**
TOTALS		**25859**	**25965**	**26101**	**26147**	**26208**	**26279**	**26348**	**26403**	**26768**	**26813**	**26894**	**26985**	**26398**

Category	Code	2007/2008 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	AVERAGE
Household I	1401	25137	25191	25239	25309	25365	25459	25464	25519	25521	25645	25643	25653	**25429**
Business I	1402	1362	1365	1371	1376	1381	1397	1396	1397	1399	1401	1399	1397	**1387**
Sport Bodies	1403	18	18	18	18	18	18	18	17	17	17	18	18	**18**
Industrial	1404	18	18	18	18	18	18	18	19	19	19	19	19	**18**
Household N	1406	21	21	21	20	20	21	21	21	20	20	21	21	**21**
Buitestedel	1413	28	27	27	27	27	27	27	27	27	27	27	27	**27**
Old Age K-Hu	1414	16	16	17	17	17	17	17	17	17	17	17	17	**17**
Governm./Sc	1415	76	79	79	79	79	79	79	79	79	79	79	79	**79**
Service Org	1417	27	27	27	27	27	27	27	27	27	27	27	27	**27**
Municipal Dep.	1418	75	76	79	79	79	79	79	77	79	79	78	79	**78**
Bulk Other	1419	91	91	91	91	91	91	91	91	91	91	91	91	**91**
Herolds Bay	1422	101	101	101	101	102	101	101	101	101	101	101	101	**101**
Apartment B	Blok	86	86	86	86	86	85	85	85	86	85	85	85	**86**
TOTALS		**27056**	**27116**	**27174**	**27248**	**27310**	**27419**	**27423**	**27477**	**27483**	**27608**	**27605**	**27614**	**27378**

Category	Code	2008/2009 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	AVERAGE
Household I	1401	25706	25734	25812	25879	25891	25947	26074	26075	26235	26303	26318	26350	**26027**
Business I	1402	1410	1407	1421	1420	1423	1422	1422	1422	1431	1433	1441	1442	**1425**
Sport Bodies	1403	18	18	18	18	18	18	18	18	18	18	18	18	**18**
Industrial	1404	19	19	19	19	19	18	18	18	18	18	18	18	**18**
Household N	1406	21	21	21	21	21	21	21	21	21	21	21	21	**21**
Buitestedel	1413	28	28	28	28	28	29	29	29	29	29	29	29	**29**
Old Age K-Hu	1414	17	17	17	17	17	17	17	17	17	17	17	17	**17**
Governm./Sc	1415	79	79	80	81	81	81	81	81	81	81	82	82	**81**
Service Org	1417	27	27	27	27	27	27	27	27	27	27	27	27	**27**
Municipal Dep.	1418	79	78	79	79	79	82	85	86	86	86	86	87	**83**
Bulk Other	1419	91	91	91	91	91	92	92	92	92	91	91	91	**91**
Herolds Bay	1422	101	101	101	101	101	101	101	101	101	101	102	102	**101**
Apartment B	Blok	86	86	86	86	86	86	86	86	85	85	86	86	**86**
TOTALS		**27682**	**27706**	**27800**	**27867**	**27882**	**27941**	**28071**	**28073**	**28241**	**28310**	**28336**	**28370**	**28023**

Category	Code	2009/2010 Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	AVERAGE
Indigent (Masakhane)	1400								10814	10872	10926	11018	11140	**26844**
Household I	1401	26515	26540	26474	26499	26543	26567	27031	16636	16049	15746	16384	16369	
Business I	1402	1468	1452	1510	1506	1460	1470	1490	1500	1465	1462	1560	1526	**1489**
Sport Bodies	1403	18	18	18	18	18	18	18	18	17	17	17	17	**18**
Industrial	1404	18	18	18	18	18	6	14	20	19	16	16	19	**17**
Household N	1406	21	21	21	21	21	21	21	21	21	21	2	2	**18**
Buitestedel	1413	29	30	30	30	30	28	29	28	30	28	29	29	**29**
Old Age K-Hu	1414	17	17	17	17	17	17	17	20	19	19	20	19	**18**
Governm./Sc	1415	82	80	81	82	82	82	82	83	84	84	84	85	**83**
Service Org	1417	27	26	27	27	27	27	27	28	29	29	30	29	**28**
Municipal Dep.	1418	87	85	86	86	86	86	86	87	95	95	96	97	**89**
Bulk Other	1419	91	90	91	90	91	91	93	92	91	90	91	94	**91**
Herolds Bay	1422	103	101	102	101	101	102	103	106	106	105	105	107	**104**
Apartment B	Blok	86	86	85	86	86	88	87	90	90	90	90	90	**88**
TOTALS		**28562**	**28564**	**28560**	**28581**	**28580**	**28603**	**29098**	**29543**	**28987**	**28728**	**29542**	**29623**	**28914**

Category	Code	2010/2011													Category	Code	2010/2011												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	119338	111326	113329	125165	128045	121992	145222	131906	117058	127130	131463	122599	**1494573**	Indigent (Masakhane)	1400	11153	11321	11408	11496	11611	11610	11611	11664	11733	11711	11707	11798	**11569**
Household I	1401	194348	185833	183807	204429	201642	197240	230868	240605	201972	212686	220349	213884	**2487663**	Household I	1401	16071	16007	16003	16089	16299	16227	16190	16348	16289	16304	16643	16864	**16278**
Business I	1402	82369	85819	79076	95237	79950	80880	90272	89159	80584	82614	89343	78613	**1013916**	Business I	1402	1506	1513	1495	1524	1584	1500	1503	1550	1533	1516	1572	1570	**1531**
Sport Bodies	1403	1974	1831	1426	869	1525	1183	1421	1603	1511	2081	3022	3861	**22307**	Sport Bodies	1403	17	16	16	17	16	16	16	16	17	16	16	17	**16**
Industrial	1404	42678	46237	39888	49496	52118	48721	39256	42612	38122	44754	38131	35754	**517767**	Industrial	1404	18	18	18	18	18	18	18	19	18	18	18	18	**18**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Buitestedel	1413	4230	3540	3320	3125	5014	3754	6836	5074	2887	4263	6215	4599	**52857**	Buitestedel	1413	29	28	27	27	27	28	29	26	27	26	26	27	**27**
Old Age K-Hu	1414	3158	2723	3094	3028	2947	3055	2569	2601	2717	2860	2927	2792	**34471**	Old Age K-Hu	1414	19	19	19	20	20	19	19	20	20	19	19	21	**20**
Governm./Sc	1415	13653	16450	15393	17647	18414	16010	17606	18086	18180	23873	20905	18328	**214545**	Governm./Sc	1415	88	86	85	87	85	88	86	90	91	84	84	90	**87**
Service Org	1417	3405	3388	3005	3347	4176	3535	4547	3640	3545	3581	3725	3652	**43546**	Service Org	1417	29	29	29	29	29	29	29	29	29	30	30	30	**29**
Municipal Dep.	1418	3637	4144	3705	5837	3378	4588	8372	6401	6067	7195	7171	5579	**66074**	Municipal Dep.	1418	98	100	101	100	103	101	102	102	102	102	102	102	**101**
Bulk Other	1419	2603	1946	2040	2277	2250	2539	2270	1994	1984	1958	2253	2100	**26214**	Bulk Other	1419	92	95	94	94	95	97	97	98	99	99	99	102	**97**
Herolds Bay	1422	3669	3866	3781	3839	4354	4136	4903	4711	4449	5028	4732	4565	**52033**	Herolds Bay	1422	108	106	106	106	106	109	107	108	109	109	107	110	111	**108**
Apartment B	Blok	13193	13373	12276	12825	13007	17281	15746	14105	13862	14847	13080	12581	**166176**	Apartment B	Blok	90	90	90	90	90	90	90	90	90	90	90	90	**90**
TOTALS		**488255**	**480476**	**464140**	**527121**	**516820**	**504914**	**569888**	**562497**	**492938**	**532870**	**543316**	**508907**	**6192142**	**TOTALS**		**29319**	**29429**	**29492**	**29698**	**30087**	**29931**	**29899**	**30162**	**30158**	**30123**	**30517**	**30841**	**29971**
Category	**Code**	**2011/2012**													**Category**	**Code**	**2011/2012**												**AVERAGE**
		Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	**TOTAL**			**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	
Indigent (Masakhane)	1400	121635	124143	125772	137343	126213	136577	145189	145009	144645	150466	132822	135815	**1625629**	Indigent (Masakhane)	1400	11764	11792	11868	11867	11932	11931	11939	12176	12132	12402	12547	12644	**12083**
Household I	1401	223056	209886	220084	227029	218458	253644	261465	281354	286765	260896	224223	236146	**2903006**	Household I	1401	16547	16773	16921	17240	17153	17154	17248	17747	17288	17407	17255	17076	**17151**
Business I	1402	107948	112945	122229	134237	145248	145486	145732	149794	144689	132854	235794	132075	**1709031**	Business I	1402	1538	1528	1530	1588	1557	1520	1527	1557	1554	1562	1566	1535	**1547**
Sport Bodies	1403	1508	2269	2300	2306	2582	3052	2104	4586	3905	3233	1728	1681	**31254**	Sport Bodies	1403	17	17	17	18	17	17	17	17	18	17	17	17	**17**
Industrial	1404	2636		0										**2636**	Industrial	1404	5		13										**9**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Buitestedel	1413	3905	6693	3239	2955	3194	2638	3501	3188	3789	6566	8551	6844	**55063**	Buitestedel	1413	26	26	26	26	26	26	26	26	25	26	25	26	**26**
Old Age K-Hu	1414	2815	2780	3384	3453	3309	3320	3083	3148	3565	3232	2938	3242	**38269**	Old Age K-Hu	1414	19	20	19	19	20	19	19	20	19	19	23	20	**20**
Governm./Sc	1415	17676	20622	22883	21561	17945	21188	17291	18083	23565	21439	20109	27389	**249751**	Governm./Sc	1415	83	86	86	84	86	84	84	91	88	85	86	89	**86**
Service Org	1417	3699	3360	3448	3539	3585	3546	3477	3287	3678	3831	3246	3775	**42471**	Service Org	1417	30	30	30	30	30	30	30	31	30	30	31	30	**30**
Municipal Dep.	1418	5314	6262	8757	8903	12151	9434	12057	10788	14167	15258	12928	13897	**129916**	Municipal Dep.	1418	110	109	109	113	113	113	113	113	114	113	115	113	**112**
Bulk Other	1419	1938	2105	2532	2329	2188	2358	2205	2443	2794	2839	2369	2432	**28532**	Bulk Other	1419	100	100	99	103	101	102	100	103	106	102	104	109	**102**
Herolds Bay	1422	4275	4041	4499	4610	4894	6045	5836	7344	6764	6198	4501	4978	**63985**	Herolds Bay	1422	106	106	105	106	106	104	104	102	100	99	100	99	**103**
Apartment B	Blok	13741	12530	12920	13413	13868	14806	16222	16148	15022	13473	12719	14412	**169274**	Apartment B	Blok	90	90	90	90	90	90	90	90	90	90	90	90	**90**
GEORGE TOTAL		**510146**	**507636**	**532047**	**561678**	**553635**	**602094**	**618162**	**645172**	**653348**	**620285**	**661928**	**582686**	**7048817**	**GEORGE TOTAL**		**30436**	**30678**	**30914**	**31285**	**31232**	**31191**	**31298**	**32074**	**31565**	**31953**	**31960**	**31849**	**31377**
UNIONDALE															**UNIONDALE**														
Uniondale Ind Res	1450		2889	2543	2218	2705	3207	4077	3483	3471	3372	4085	3999	**36049**	Uniondale Ind Res	1450		278	278	279	280	279	279	280	328	341	386	401	**310**
Uniondale Res	1451	11733	6593	8518	6789	8960	10455	12902	11822	11424	10836	6883	6903	**113818**	Uniondale Res	1451	827	538	538	539	551	876	548	779	502	480	443	418	**587**
Uniondale Bus	1452	2085	2008	2283	1532	1700	1945	2184	2661	16797	2749	1932	2337	**40213**	Uniondale Bus	1452	37	37	49	37	41	37	38	37	38	40	37	39	**39**
Uniondale Schools	1454		3277	653	1982	1998	542	388	519	552	396	314	464	**11085**	Uniondale Schools	1454		5	5	5	5	5	5	5	5	5	5	5	**5**
Uniondale Churches	1455		184	199	220	288	370	494	444	441	358	187	246	**3431**	Uniondale Churches	1455		13	13	13	13	13	13	13	12	12	12	12	**13**
UNIONDALE TOTAL		**13818**	**14951**	**14196**	**12741**	**15651**	**16519**	**20045**	**18929**	**32685**	**17711**	**13401**	**13949**	**204596**	**UNIONDALE TOTAL**		**864**	**871**	**883**	**873**	**890**	**1210**	**883**	**1114**	**885**	**878**	**883**	**875**	**953**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470		2284	2030	1913	1981	2822	2814	2163	3025	2328	2305	2857	**26522**	Haarlem Ind Res	1470		202	202	203	204	202	203	205	202	229	232	249	**212**
Haarlem Res	1471	7717	4042	4451	3320	3384	5943	3703	3450	7585	2467	2546	2472	**51080**	Haarlem Res	1471	478	276	280	284	278	278	283	296	277	249	251	232	**289**
Haarlem Bus	1472		0	0	0	1	1	1	1	1	0	1	0	**6**	Haarlem Bus	1472		1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474		92	8	23	72	72	66	9	122	66	65	193	**788**	Haarlem Schools	1474		1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475		59	26	50	23	41	31	42	36	12	17	50	**387**	Haarlem Churches	1475		4	4	4	4	4	4	4	4	4	4	4	**4**
HAARLEM TOTAL		**7717**	**6477**	**6515**	**5306**	**5461**	**8879**	**6615**	**5665**	**10769**	**4873**	**4934**	**5572**	**78783**	**HAARLEM TOTAL**		**478**	**484**	**488**	**493**	**488**	**486**	**492**	**507**	**485**	**484**	**489**	**487**	**507**
GEORGE MUN TOTAL		**531681**	**529064**	**552758**	**579725**	**574747**	**627492**	**644822**	**669766**	**696802**	**642869**	**680263**	**602207**	**7332196**	**GEORGE MUN TOTAL**		**31778**	**32033**	**32285**	**32651**	**32610**	**32887**	**32673**	**33695**	**32935**	**33315**	**33332**	**33211**	**32784**
Category	**Code**	**2012/2013**													**Category**	**Code**	**2012/2013**												**AVERAGE**
		Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	**TOTAL**			**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	
Indigent (Masakhane)	1400	136410	128235	137467	139582	132848	148577	150174	139848	139035	141655.759	133065.241	131658.31	**1658555**	Indigent (Masakhane)	1400	12186	12245	12328	12391	12383	12441	12474	12502	12531	12576	12582	12599	**12437**
Household I	1401	242493	209557	245705	255083	241262	265464	285352	301525	267272	269824	260623	256082	**3100242**	Household I	1401	17281	17232	17280	17251	17265	17266	17235	17220	17206	17184	17196	17215	**17236**
Business I	1402	122349	131484	158125	159867	155219	152554	174115	141514	154829	143894	143807	146940	**1784697**	Business I	1402	1518	1523	1545	1547	1547	1551	1551	1551	1591	1593	1598	1598	**1559**
Sport Bodies	1403	1496	1416		3030	1305	2294	1935	4122	2336	2440	3791	1710	**25875**	Sport Bodies	1403	17	17	0	17	17	17	17	17	17	17	17	17	**16**
Industrial	1404	0	0	1161					0		0	0	0	**1161**	Industrial	1404	0	0	17	0	0	0	0	1	0	1	1	1	**2**
Household N	1406	0	0	0	0	0	0	0		0				**0**	Household N	1406	1	1	1	1	1	1	1	0	1	0	0	0	**1**
Buitestedel	1413	4300	2825	0	0	0	0	0	0	0	0	0	0	**7125**	Buitestedel	1413	25	22	0	0	0	0	0	0	0	0	0	0	**4**
Old Age K-Hu	1414	3290	2915	3662	3329	2973	3412	3714	3007	3413	3492	3406	3565	**40178**	Old Age K-Hu	1414	20	20	20	20	20	20	20	20	20	20	20	20	**20**
Governm./Sc	1415	20005	18511	22757	19738	29253	26675	27273	28249	32568	31991	23849	22775	**303644**	Governm./Sc	1415	84	84	84	84	84	84	84	84	85	85	84	84	**84**
Service Org	1417	3469	3957	3801	3532	3726	3708	4282	4315	3746	2782	4375	4026	**45719**	Service Org	1417	30	30	30	30	30	30	30	30	31	31	31	31	**30**
Municipal Dep.	1418	11116	13669	9380	10006	22603	12281	20022	15056	15225	19011	14035	22596	**185000**	Municipal Dep.	1418	113	114	115	115	115	118	118	118	118	118	118	118	**117**
Bulk Other	1419	2546	2667	2881	3126	2697	3059	3158	2853	3055	2892	2995	3049	**34978**	Bulk Other	1419	102	102	102	102	102	103	103	103	103	103	105	105	**103**
Herolds Bay	1422	4041	3813	0	0	0	0	0	0	0	0	0	0	**7854**	Herolds Bay	1422	99	97	0	0	0	0	0	0	0	0	0	0	**16**
Apartment B	Blok	15228	12993	15755	16576	14902	16303	17547	18292	17120	16862	16755	15804	**194137**	Apartment B	Blok	90	90	89	89	89	88	88	88	88	88	88	88	**89**
GEORGE TOTAL		**566743**	**532042**	**600694**	**613869**	**606788**	**634327**	**687572**	**658781**	**638599**	**634844**	**606701**	**608205**	**7389165**	**GEORGE TOTAL**		**31566**	**31577**	**31611**	**31647**	**31653**	**31719**	**31721**	**31734**	**31791**	**31816**	**31840**	**31876**	**31713**
UNIONDALE															**UNIONDALE**														
Uniondale Ind Res	1450	3147	4132	3715	4648	4187	5698	5201	4634	4402	4909	4027	4243	**52943**	Uniondale Ind Res	1450	397	406	410	418	419	419	424	425	427	443	447	452	**424**
Uniondale Res	1451	5657	5835	6183	6521	5633	8700	7908	6963	7289	7118	6002	6349	**80158**	Uniondale Res	1451	421	412	408	400	399	399	394	393	391	377	372	368	**395**
Uniondale Bus	1452	2386	2289	2375	2025	1948	2681	2188	2086	2368	2446	1854	2566	**27212**	Uniondale Bus	1452	38	38	41	41	41	41	41	41	41	41	41	41	**41**
Uniondale Schools	1454	307	421	389	349	342	359	192	268	286	319	333	334	**3899**	Uniondale Schools	1454	5	5	2	2	2	2	2	2	2	2	2	2	**3**
Uniondale Churches	1455	160	166	246	355	255	403	407	329	411	411	245	207	**3595**	Uniondale Churches	1455	11	11	11	11	11	12	12	12	13	13	13	13	**12**
UNIONDALE TOTAL		**11657**	**12843**	**12908**	**13898**	**12365**	**17841**	**15896**	**14280**	**14756**	**15203**	**12461**	**13699**	**167807**	**UNIONDALE TOTAL**		**872**	**872**	**872**	**872**	**872**	**873**	**873**	**873**	**874**	**876**	**875**	**876**	**873**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	2992	3783	3801	3587	3404	5128	5186	4518	4274	4279	3177	3386	**47515**	Haarlem Ind Res	1470	260	261	263	271	278	278	279	277	276	278	278	277	**273**
Haarlem Res	1471	3149	2447	2440	2670	3052	3780	3504	3150	3415	3591	2942	4147	**38287**	Haarlem Res	1471	219	218	220	213	206	206	205	207	208	206	206	207	**210**
Haarlem Bus	1472	32	30	1119	749	581	740	642	652	1107	18	7	7	**5684**	Haarlem Bus	1472	1	1	2	2	2	2	2	2	2	1	1	1	**2**
Haarlem Schools	1474	92	855	0	0	0	0	0	0	0	1027	1027	1058	**4059**	Haarlem Schools	1474	1	1	0	0	0	0	0	0	0	1	1	1	**0**
Haarlem Churches	1475	44	11	17	16	19	40	33	13	13	26	15	234	**481**	Haarlem Churches	1475	4	4	4	4	4	4	4	4	4	4	4	4	**4**
HAARLEM TOTAL		**6309**	**7126**	**7377**	**7022**	**7056**	**9688**	**9365**	**8333**	**8809**	**8941**	**7168**	**8832**	**96026**	**HAARLEM TOTAL**		**485**	**485**	**489**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**490**	**489**
GEORGE MUN TOTAL		**584709**	**552011**	**620979**	**634789**	**626209**	**661856**	**712833**	**681394**	**662164**	**658988**	**626330**	**630736**	**7652998**	**GEORGE MUN TOTAL**		**32923**	**32934**	**32972**	**33009**	**33015**	**33082**	**33084**	**33097**	**33155**	**33182**	**33205**	**33242**	**33075**

Category	Code	2013/2014												
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL
Indigent (Masakhane)	1400	148601	130173	141027	139645	147010	142691	162918	154842	172906	153257	159291	148590	**1800951**
Household I	1401	264656	231076	256428	253385	264958	248733	274357	301869	303216	252980	252638	238416	**3142712**
Business I	1402	108268	109214	128810	127971	135857	118548	120621	128650	121960	112667	111000	107591	**1431157**
Sport Bodies	1403	1750	2206	1372	2352	2258	1990	3487	2491	4495	2693	6413	1847	**33354**
Industrial	1404	25028	22905	28234	28255	29475	27145	33954	33865	24740	29614	27720	28801	**339736**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3683	3162	3993	3912	4550	4455	3118	3663	4839	3439	3357	3284	**45455**
Governm./Sc	1415	20941	21772	28109	21756	21995	23134	19022	22243	27120	22827	44361	42564	**315844**
Service Org	1417	3338	3020	3248	2975	2962	3390	2897	3167	3177	3347	3368	3847	**38736**
Municipal Dep.	1418	13410	12833	10184	13121	12475	13124	18549	13148	13807	13093	12190	11476	**157410**
Bulk Other	1419	3218	3098	3062	2810	2957	2722	2873	2527	3153	2584	2963	2719	**34686**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	15865	13790	15455	15220	14912	14203	16014	16101	15615	15066	15345	14915	**182501**
GEORGE TOTAL		**608758**	**553249**	**619922**	**611402**	**639409**	**600135**	**657810**	**682566**	**695028**	**611567**	**638646**	**604050**	**7522542**
UNIONDALE														
Uniondale Ind Res	1450	3970	4058	3777	4563	4662	4554	4546	6837	5191	4259	4722	3889	**55028**
Uniondale Res	1451	4784	5412	4927	6364	6177	5907	6200	9226	7240	6018	6116	4851	**73222**
Uniondale Bus	1452	2066	2838	1994	2166	2202	1875	1995	2570	2644	2072	1576	1687	**25685**
Uniondale Schools	1454	204	383	459	319	319	167	167	124	317	159	137	384	**3139**
Uniondale Churches	1455	144	177	171	327	184	280	224	512	384	263	230	237	**3133**
UNIONDALE TOTAL		**11168**	**12868**	**11328**	**13739**	**13544**	**12783**	**13132**	**19269**	**15776**	**12771**	**12781**	**11048**	**160207**
HAARLEM														
Haarlem Ind Res	1470	2878	3423	3063	3914	3822	3502	3527	7128	4225	3998	3328	2890	**45698**
Haarlem Res	1471	3239	3439	2578	2609	2655	2565	2419	3979	2422	2385	2189	1955	**32434**
Haarlem Bus	1472	5	5	4	6	20	18	18	79	41	18	6	204	**424**
Haarlem Schools	1474	888	984	814	570	632	695	719	224	526	473	433	773	**7731**
Haarlem Churches	1475	21	52	96	27	4	12	12	40	17	7	59	26	**373**
HAARLEM TOTAL		**7031**	**7903**	**6555**	**7126**	**7133**	**6792**	**6695**	**11450**	**7231**	**6881**	**6015**	**5848**	**86660**
GEORGE MUN TOTAL		**626957**	**574020**	**637805**	**632267**	**660086**	**619710**	**677637**	**713285**	**718035**	**631219**	**657442**	**620946**	**7769409**

Category	Code	2013/2014												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	12611	12648	12688	12729	12863	12932	12976	13079	13168	13218	13316	13339	**12964**
Household I	1401	17221	17204	17205	17223	17227	17184	17148	17058	17018	16983	16959	16957	**17116**
Business I	1402	1603	1607	1610	1614	1618	1618	1622	1621	1620	1620	1620	1621	**1616**
Sport Bodies	1403	17	17	17	17	17	17	17	17	17	17	17	16	**17**
Industrial	1404	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Household N	1406	1	1	1	0	0	0	0	0	0	0	1	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	20	20	20	21	21	21	21	22	23	23	23	23	**22**
Governm./Sc	1415	84	85	85	85	85	85	85	84	87	87	87	87	**86**
Service Org	1417	29	29	29	29	29	29	29	29	29	29	29	29	**29**
Municipal Dep.	1418	119	121	121	121	122	122	123	123	123	128	192	191	**134**
Bulk Other	1419	105	105	105	105	105	105	106	106	106	106	106	106	**106**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	88	88	87	87	87	87	87	87	87	87	87	87	**87**
GEORGE TOTAL		**31901**	**31928**	**31971**	**32034**	**32177**	**32203**	**32217**	**32229**	**32281**	**32301**	**32440**	**32459**	**32178**
UNIONDALE														
Uniondale Ind Res	1450	458	458	458	459	461	464	464	469	466	481	484	480	**467**
Uniondale Res	1451	362	362	362	361	359	363	363	357	361	344	341	346	**357**
Uniondale Bus	1452	41	41	41	41	41	41	41	42	42	42	42	43	**42**
Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	13	13	13	13	13	13	13	13	13	13	13	13	**13**
UNIONDALE TOTAL		**876**	**876**	**876**	**876**	**876**	**883**	**883**	**883**	**884**	**882**	**882**	**884**	**880**
HAARLEM														
Haarlem Ind Res	1470	277	277	274	280	290	291	291	292	292	292	293	292	**287**
Haarlem Res	1471	207	208	197	191	180	179	179	178	178	178	177	179	**186**
Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	3	3	3	**2**
Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	4	3	3	3	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**490**	**490**	**476**	**476**	**474**	**474**	**474**	**474**	**474**	**476**	**476**	**477**	**478**
GEORGE MUN TOTAL		**33267**	**33294**	**33323**	**33386**	**33527**	**33560**	**33574**	**33586**	**33639**	**33659**	**33798**	**33820**	**33536**

Category	Code	2014/2015												TOTAL
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Household I	1401	394485	406166	429482	427894	384812	443696	449825	466210	416431	428830	427484	402808	**5078123**
Business I	1402	111654	101731	113122	109636	101087	111802	211219	116709	115300	110133	110430	110077	**1422900**
Sport Bodies	1403	1280	1872	1373	1631	1518	1907	4484	3341	2915	2618	2279	2181	**27399**
Industrial	1404	22138	24004	33191	31593	42682	37527	38806	36651	39303	37116	36659	35679	**415349**
Household N	1406	0	0	0				0	0	0	0	0		**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3741	3585	4046	4142	3711	4362	3885	3903	3144	3718	3867	2877	**44981**
Governm./Sc	1415	23812	31458	30874	23124	23341	21913	16781	20296	27016	25091	23527	26193	**293426**
Service Org	1417	3807	3611	3990	3254	3660	4908	3786	2705	3618	2985	2994	3735	**43053**
Municipal Dep.	1418	18625	17545	14383	15386	14366	14430	18696	16514	12230	11681	13300	13323	**180479**
Bulk Other	1419	2708	2774	3223	2924	2655	2903	2954	3058	3036	3074	2872	2452	**34633**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	0	0	16315	26048	14387	15826	16540	16688	17257	16238	15373	15945	**170617**
GEORGE TOTAL		**582250**	**592746**	**649999**	**645632**	**592219**	**659274**	**766976**	**686075**	**640250**	**641484**	**638785**	**615270**	**7710960**
UNIONDALE														
Uniondale Municipal	1410	0	0	0	0	0	141	0	0	863	888	753	642	**3287**
Uniondale Ind Res	1450	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Uniondale Res	1451	10285	11117	11072	11354	12775	12356	16957	13089	12831	12269	10263	10341	**144709**
Uniondale Bus	1452	1608	2055	2243	2061	2550	1992	2121	2217	2708	2580	1937	1916	**25987**
Uniondale Schools	1454	355	758	673	524	644	511	599	686	576	610	556	436	**6925**
Uniondale Churches	1455	245	235	222	270	213	257	381	341	320	193	141	161	**2980**
UNIONDALE TOTAL		**12492**	**14164**	**14210**	**14209**	**16182**	**15257**	**20058**	**16333**	**17297**	**16540**	**13650**	**13495**	**183888**
HAARLEM														
Haarlem Ind Res	1470	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Haarlem Res	1471	3913	4230	6802	6245	6388	7048	9467	7624	6864	6032	4912	4878	**74403**
Haarlem Bus	1472	112	143	125	106	116	118	130	141	31	21	13	23	**1080**
Haarlem Schools	1474	355	758	673	524	644	511	599	686	576	610	556	436	**6925**
Haarlem Churches	1475	38	36	34	42	33	40	59	53	49	45	32	37	**497**
HAARLEM TOTAL		**4418**	**5167**	**7634**	**6917**	**7181**	**7716**	**10254**	**8504**	**7520**	**6707**	**5513**	**5374**	**82904**
GEORGE MUN TOTAL		**599160**	**612077**	**671843**	**666758**	**615582**	**682247**	**797288**	**710912**	**665067**	**664731**	**657948**	**634139**	**7977752**

Category	Code	2014/2015												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	4	4	4	4	3	3	3	3	3	3	3	3	**3**
Household I	1401	30387	30403	30356	30404	30423	30423	30484	30522	30559	30592	30695	30735	**30499**
Business I	1402	1626	1625	1627	1638	1640	1639	1643	1650	1653	1652	1652	1654	**1642**
Sport Bodies	1403	16	16	16	16	16	16	16	16	16	16	17	17	**16**
Industrial	1404	3	3	3	3	4	4	4	4	5	5	5	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0		**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	24	25	25	26	26	26	27	27	27	27	28	28	**26**
Governm./Sc	1415	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Service Org	1417	29	29	29	29	29	29	29	29	29	29	29	29	**29**
Municipal Dep.	1418	205	205	281	279	279	279	280	280	281	281	281	281	**268**
Bulk Other	1419	106	106	106	106	106	106	106	106	107	107	107	107	**106**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	1	1	84	85	85	85	85	84	84	84	84	84	**71**
GEORGE TOTAL		**32488**	**32504**	**32618**	**32677**	**32698**	**32697**	**32764**	**32808**	**32851**	**32883**	**32988**	**33029**	**32750**
UNIONDALE														
Uniondale Municipal	1410	1	1	1	1	1	1	1	1	3	3	3	5	**2**
Uniondale Ind Res	1450	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Uniondale Res	1451	954	954	954	955	955	955	955	955	955	955	955	954	**955**
Uniondale Bus	1452	43	44	45	45	45	45	45	47	48	49	49	49	**46**
Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	13	13	13	13	13	13	13	13	13	13	13	13	**13**
UNIONDALE TOTAL		**1013**	**1014**	**1015**	**1016**	**1016**	**1016**	**1016**	**1018**	**1021**	**1022**	**1022**	**1023**	**1018**
HAARLEM														
Haarlem Ind Res	1470	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Haarlem Res	1471	363	363	361	363	363	363	363	363	362	389	403	403	**372**
Haarlem Bus	1472	3	3	3	3	3	3	3	3	1	1	1	1	**2**
Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	3	3	3	**2**
HAARLEM TOTAL		**369**	**369**	**367**	**369**	**369**	**369**	**369**	**369**	**366**	**394**	**408**	**408**	**377**
GEORGE MUN TOTAL		**33870**	**33887**	**34000**	**34062**	**34083**	**34082**	**34149**	**34195**	**34238**	**34299**	**34418**	**34460**	**34145**

Category	Code	2015/2016												TOTAL
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	**0**	107717	121697	127760	129174	132027	145638	152564	139473	146570	144251	143 958	**1490829**
Household I	1401	410343	299786	300353	299921	296160	292724	349679	345517	312764	306260	295475	279197	**3788179**
Business I	1402	105476	259205	113905	113627	120300	114078	138720	134235	121391	125887	120619	109928	**1577371**
Sport Bodies	1403	1582	2561	2042	1932	2069	1732	3398	2687	2672	2413	2678	2270	**28036**
Industrial	1404	32546	30442	36042	37623	45006	32091	43992	40353	37117	36858	35422	39137	**446629**
Household N	1406	0	0	0					0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	2802	2758	2950	3013	3336	3491	2550	3433	2564	3670	3434	4096	**38097**
Governm./Sc	1415	30348	26797	28562	24198	24644	21961	22738	27051	31403	24946	31530	23844	**318022**
Service Org	1417	3080	3544	3057	3250	3848	2999	3070	5602	4304	3462	3204	3035	**42455**
Municipal Dep.	1418	16110	15010	15033	11527	12754	14974	17861	13693	15074	13852	12939	13063	**171890**
Bulk Other	1419	2540	2897	2856	2850	2729	2461	2755	3174	2713	2833	2785	2837	**33430**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	16376	17068	16740	16912	16698	15735	20494	18515	18105	17160	16145	17828	**207776**
GEORGE TOTAL		**621203**	**767785**	**643237**	**642613**	**656718**	**634273**	**750895**	**746824**	**687580**	**683911**	**668482**	**639193**	**8142714**
UNIONDALE														
Uniondale Municipal	1410	1098	1018	341	401	1152	692	1094	502	468	660	380	1018	**8824**
Uniondale Ind Res	1450	3053	2614	3258	4932	4269	5277	5383	4941	4447	4327	3638	4540	**50679**
Uniondale Res	1451	5349	4414	5748	5664	6304	8081	8889	8278	7231	6696	5588	5802	**78044**
Uniondale Bus	1452	1946	1815	1876	1950	1913	2100	1881	2018	2178	2152	2003	2207	**24039**
Uniondale Schools	1454	223	338	375	210	399	285	280	658	462	275	459	450	**4414**
Uniondale Churches	1455	220	188	326	256	296	356	367	395	346	325	208	317	**3600**
UNIONDALE TOTAL		**11889**	**10387**	**11924**	**13413**	**14333**	**16791**	**17894**	**16792**	**15132**	**14435**	**12276**	**14334**	**169600**
HAARLEM														
Haarlem Ind Res	1470	2529	2165	2502	2508	2997	3942	4897	4177	3333	3362	2996	3091	**38499**
Haarlem Res	1471	4155	3558	3482	2999	3410	4110	5450	4299	4084	3781	3539	3741	**46608**
Haarlem Bus	1472	32	2	2	3	9	11	8	2	13	3	10	6	**101**
Haarlem Schools	1474	750	136	626	455	449	574	364	844	783	503	690	761	**6935**
Haarlem Churches	1475	5	1	2	0	10	7	7	4	3	2	1	6	**48**

Category	Code	2015/2016												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	3	8997	9539	9877	10249	10530	10621	10791	10977	8997	11340	11 525	**9454**
Household I	1401	30765	21802	21290	21024	20655	20425	20398	20239	20116	21802	19803	19667	**21499**
Business I	1402	1639	1640	1639	1642	1642	1644	1644	1642	1646	1648	1649	1648	**1644**
Sport Bodies	1403	17	17	17	17	18	18	18	18	18	18	18	18	**18**
Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	28	28	28	28	28	28	28	28	28	28	28	28	**28**
Governm./Sc	1415	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Service Org	1417	29	29	29	29	29	29	29	29	29	29	29	29	**29**
Municipal Dep.	1418	281	281	281	278	278	278	278	278	281	281	283	283	**280**
Bulk Other	1419	107	107	107	107	108	109	109	110	110	111	111	111	**109**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	84	84	84	84	84	84	84	84	84	84	84	84	**84**
GEORGE TOTAL		**33044**	**33076**	**33105**	**33178**	**33182**	**33236**	**33300**	**33310**	**33380**	**33089**	**33436**	**33484**	**33235**
UNIONDALE														
Uniondale Municipal	1410	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Uniondale Ind Res	1450	296	300	345	427	429	428	427	435	435	441	443	447	**404**
Uniondale Res	1451	455	340	438	430	427	428	429	421	420	414	412	408	**419**
Uniondale Bus	1452	49	49	49	49	49	49	49	49	50	50	50	50	**49**
Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**821**	**710**	**853**	**927**	**926**	**926**	**926**	**926**	**926**	**926**	**926**	**926**	**893**
HAARLEM														
Haarlem Ind Res	1470	212	215	215	215	219	220	220	221	219	220	222	223	**218**
Haarlem Res	1471	394	399	274	274	271	270	270	270	272	271	269	267	**292**
Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**

HAARLEM TOTAL		**7471**	**5862**	**6614**	**5965**	**6875**	**8644**	**10726**	**9326**	**8216**	**7651**	**7236**	**7605**	**92191**	**HAARLEM TOTAL**		**610**	**618**	**493**	**493**	**494**	**494**	**494**	**495**	**495**	**495**	**495**	**494**	**514**
GEORGE MUN TOTAL		**640563**	**784034**	**661775**	**661991**	**677926**	**659708**	**779515**	**772942**	**710928**	**705997**	**687994**	**661132**	**8404505**	**GEORGE MUN TOTAL**		**34475**	**34404**	**34451**	**34598**	**34602**	**34656**	**34720**	**34731**	**34801**	**34510**	**34857**	**34904**	**34642**
Category	**Code**	**2016/2017**													**Category**	**Code**	**2016/2017**												**AVERAGE**
		Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	**TOTAL**			**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	
Indigent (Masakhane)	1400	143966	156681	156711	159880	149311	153833	176600	156968	145637	143780	137437	130 194	**1810998**	Indigent (Masakhane)	1400	**11576**	11810	11939	12050	12146	12121	12155	12434	12294	12399	12405	12 482	**12151**
Household I	1401	290809	284600	298990	291874	304476	297726	358658	317211	290941	282685	289146	273104	**3580220**	Household I	1401	**19650**	19430	19430	19334	19362	19381	19399	19482	19341	19278	19335	19349	**19398**
Business I	1402	115717	120999	110300	115404	121042	122582	136246	122402	113643	114912	113280	103440	**1409967**	Business I	1402	**1648**	1646	1649	1649	1653	1654	1659	1670	1667	1673	1676	1677	**1660**
Sport Bodies	1403	1883	2008	2485	1700	3377	2638	3254	3419	2083	2741	2577	1873	**30038**	Sport Bodies	1403	**18**	18	18	18	18	8	18	18	18	18	18	18	**17**
Industrial	1404	36673	39161	36828	42335	36925	38748	43328	39060	37288	38839	42174	31532	**462891**	Industrial	1404	**4**	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	4617	2859	4640	4263	3191	3559	3178	3301	3199	3783	2900	3169	**42659**	Old Age K-Hu	1414	**28**	28	28	28	28	28	28	33	29	29	29	33	**29**
Governm./Sc	1415	18014	22423	23583	22435	20787	25170	18117	24388	24270	23036	24499	22674	**269396**	Governm./Sc	1415	**87**	87	87	87	88	88	88	89	88	89	90	90	**88**
Service Org	1417	3247	3227	3667	3496	2818	3152	3013	3509	3010	3453	3446	3023	**39061**	Service Org	1417	**29**	29	29	29	29	29	29	32	29	29	29	29	**29**
Municipal Dep.	1418	13984	15662	16109	17731	18824	17095	19624	19553	14464	17357	13993	15629	**200025**	Municipal Dep.	1418	**304**	304	309	309	308	309	308	308	308	308	308	315	**308**
Bulk Other	1419	2720	2288	2819	2632	2517	2625	2615	2531	2669	2943	3056	2633	**32048**	Bulk Other	1419	**111**	111	111	111	111	111	111	117	111	111	111	112	**112**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	15365	17204	18052	17331	18516	19117	19444	18088	17762	16728	17482	17979	**213068**	Apartment B	Blok	**84**	84	84	84	84	84	84	84	84	84	84	84	**84**
GEORGE TOTAL		**646995**	**667112**	**674184**	**679081**	**681784**	**686245**	**784077**	**710430**	**654966**	**650257**	**649990**	**605250**	**8090371**	**GEORGE TOTAL**		**33539**	**33551**	**33688**	**33703**	**33831**	**33817**	**33883**	**34271**	**33973**	**34022**	**34089**	**34193**	**33880**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	365	378	748	817	544	589	845	290	373	314	275	272	**5810**	Uniondale Municipal	1410	**5**	5	5	5	5	5	5	5	5	5	5	5	**5**
Uniondale Ind Res	1450	3659	4268	4811	4811	5081	4663	7306	5033	4471	5092	4494	4351	**58040**	Uniondale Ind Res	1450	**455**	459	471	484	497	493	496	523	508	514	513	516	**494**
Uniondale Res	1451	4974	5265	6406	6307	6682	6330	9426	6003	5655	5536	5074	4536	**72194**	Uniondale Res	1451	**407**	403	391	378	369	373	370	365	358	353	354	351	**373**
Uniondale Bus	1452	1809	2388	2933	3085	2410	2824	2834	2152	1969	2164	2394	1862	**28824**	Uniondale Bus	1452	**50**	50	50	50	50	50	50	50	50	50	50	50	**50**
Uniondale Schools	1454	207	379	383	398	349	407	243	661	518	261	327	321	**4454**	Uniondale Schools	1454	**2**	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	192	214	369	378	421	351	507	341	302	297	229	227	**3828**	Uniondale Churches	1455	**14**	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**11206**	**12892**	**15650**	**15796**	**15487**	**15164**	**21161**	**14480**	**13288**	**13664**	**12793**	**11569**	**173150**	**UNIONDALE TOTAL**		**933**	**933**	**933**	**933**	**937**	**937**	**937**	**959**	**937**	**938**	**938**	**938**	**938**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	2748	2945	3950	3973	3730	3592	4808	3542	3300	3469	3339	2986	**42382**	Haarlem Ind Res	1470	**223**	223	223	224	224	225	225	231	227	229	229	229	**226**
Haarlem Res	1471	3407	3311	3830	3762	3789	3672	4911	3537	3191	3324	3366	2956	**43056**	Haarlem Res	1471	**267**	267	267	266	266	265	265	264	263	261	261	261	**264**
Haarlem Bus	1472	4	6	2	3	8	4	10	4	7	3	0	0	**51**	Haarlem Bus	1472	**1**	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	471	638	698	1050	656	642	623	730	639	761	493	705	**8106**	Haarlem Schools	1474	**1**	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	15	11	9	8	11	16	5	9	14	22	21	44	**185**	Haarlem Churches	1475	**2**	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**6645**	**6911**	**8489**	**8796**	**8194**	**7926**	**10357**	**7822**	**7151**	**7579**	**7219**	**6691**	**93780**	**HAARLEM TOTAL**		**494**	**494**	**494**	**494**	**494**	**494**	**494**	**499**	**494**	**494**	**494**	**494**	**494**
GEORGE MUN TOTAL		**664846**	**686915**	**698323**	**703673**	**705465**	**709335**	**815595**	**732732**	**675405**	**671500**	**670002**	**623510**	**8357301**	**GEORGE MUN TOTAL**		**34966**	**34978**	**35115**	**35130**	**35262**	**35248**	**35314**	**35729**	**35404**	**35454**	**35521**	**35625**	**35312**
Category	**Code**	**2017/2018**													**Category**	**Code**	**2017/2018**												**AVERAGE**
		Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	**TOTAL**			**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	
Indigent (Masakhane)	1400	148494	138363	137757	136682	131499	133370	146772	147787	139253	121575	122650	128280	**1632482**	Indigent (Masakhane)	1400	12944	13051	13087	13148	13214	13233	13194	13253	13315	13328	13397	13 415	**13215**
Household I	1401	281040	262297	243633	230346	230519	251848	278606	287733	244114	223947	228218	245004	**3007306**	Household I	1401	19310	19272	19243	19313	19342	19348	19458	19425	19414	19502	19546	19527	**19392**
Business I	1402	108273	109780	107311	106703	99714	105737	112222	118819	107299	108324	99632	91928	**1275742**	Business I	1402	1678	1678	1677	1681	1684	1687	1687	1689	1691	1695	1696	1699	**1687**
Sport Bodies	1403	1409	1106	723	799	1139	936	1586	1819	1793	1082	1100	1492	**14984**	Sport Bodies	1403	18	18	16	16	16	16	16	16	16	16	16	16	**16**
Industrial	1404	34573	34414	31982	37093	34041	31665	37896	33984	31427	41515	34566	35990	**419146**	Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3202	2994	2729	2552	2509	2712	2814	3068	3010	2436	2739	2803	**33568**	Old Age K-Hu	1414	33	34	34	34	34	34	33	33	33	33	33	33	**33**
Governm./Sc	1415	17408	21255	20800	20396	18504	15071	13216	18065	19222	15279	19229	20777	**219222**	Governm./Sc	1415	90	90	90	90	90	90	91	91	89	89	89	89	**90**
Service Org	1417	3267	2819	3131	2949	2535	2435	2389	2358	2544	2850	2259	2600	**32136**	Service Org	1417	29	29	29	31	31	31	31	31	31	31	31	31	**31**
Municipal Dep.	1418	15572	14806	15139	15043	13497	15833	19399	18796	14266	21984	17053	14925	**196313**	Municipal Dep.	1418	315	315	317	317	317	313	315	313	314	306	306	307	**313**
Bulk Other	1419	3139	3023	3140	3149	2812	3206	2698	2728	2618	2387	1856	2643	**33399**	Bulk Other	1419	112	112	112	112	112	112	112	112	112	112	112	112	**112**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	15256	16218	14315	15629	13496	15139	17185	15524	14612	13641	13479	13792	**178286**	Apartment B	Blok	84	84	84	84	84	84	84	84	84	84	84	84	**84**
GEORGE TOTAL		**631633**	**607075**	**580660**	**571341**	**550265**	**577952**	**634783**	**650681**	**580158**	**555020**	**542781**	**560234**	**7042584**	**GEORGE TOTAL**		**34617**	**34687**	**34693**	**34830**	**34928**	**34952**	**35025**	**35051**	**35103**	**35200**	**35314**	**35317**	**34976**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	2852	3479	2935	1766	98	91	100	229	222	217	232	1086	**13307**	Uniondale Municipal	1410	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Uniondale Ind Res	1450	5014	4544	5718	5782	6556	6100	7170	7123	5089	4397	4433	5649	**67575**	Uniondale Ind Res	1450	633	635	636	637	639	642	641	642	639	640	640	641	**639**
Uniondale Res	1451	4216	4709	3928	4865	5195	4893	5835	5584	4568	3640	4335	4615	**56383**	Uniondale Res	1451	350	350	349	349	347	344	346	344	349	348	348	347	**348**
Uniondale Bus	1452	2214	2259	2100	2129	2733	2230	2119	2582	2658	2343	2614	2434	**28415**	Uniondale Bus	1452	50	51	51	51	51	51	51	52	53	53	53	53	**52**
Uniondale Schools	1454	398	355	387	256	394	310	222	304	205	131	234	271	**3467**	Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	215	265	235	224	245	216	262	212	308	221	240	218	**2861**	Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**14909**	**15611**	**15303**	**15022**	**15221**	**13840**	**15708**	**16034**	**13050**	**10949**	**12088**	**14273**	**172008**	**UNIONDALE TOTAL**		**1054**	**1057**	**1057**	**1058**	**1058**	**1058**	**1059**	**1059**	**1062**	**1062**	**1062**	**1062**	**1059**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	3081	3049	2862	3151	3439	3473	4243	3308	2893	2702	2824	3039	**38064**	Haarlem Ind Res	1470	235	236	241	242	242	243	243	243	243	243	244	248	**242**
Haarlem Res	1471	2787	2488	2489	2697	2886	3196	3811	3579	3019	2622	3091	2534	**35199**	Haarlem Res	1471	255	254	249	248	248	247	247	247	248	248	247	243	**248**
Haarlem Bus	1472	0	0	3	8	12	11	32	15	4	2	8	14	**109**	Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	770	691	648	557	755	676	732	457	350	715	777	558	**7686**	Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	55	22	20	5	8	18	2	14	11	45	104	15	**319**	Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**6693**	**6250**	**6022**	**6418**	**7100**	**7374**	**8820**	**7373**	**6277**	**6086**	**6804**	**6160**	**81377**	**HAARLEM TOTAL**		**494**	**494**	**494**	**494**	**494**	**494**	**494**	**494**	**495**	**495**	**495**	**495**	**494**
GEORGE MUN TOTAL		**653235**	**628936**	**601985**	**592781**	**572586**	**599166**	**659311**	**674088**	**599485**	**572055**	**561673**	**580667**	**7295969**	**GEORGE MUN TOTAL**		**36165**	**36238**	**36244**	**36382**	**36480**	**36504**	**36578**	**36604**	**36660**	**36757**	**36871**	**36874**	**36530**
Category	**Code**	**2018/2019**													**Category**	**Code**	**2018/2019**												**AVERAGE**
		Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	**TOTAL**			**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Febr**	**Mar**	**Apr**	**May**	**Jun**	
Indigent (Masakhane)	1400	137963.4	140585	129780	134384	146959	133601	153200	149893	148455	149781	149957	135965	**1710523**	Indigent (Masakhane)	1400	13438	13424	13098	13141	13141	13151	13142	13183	13213	13268	13270	13 309	**13232**
Household I	1401	240931	253821	248160	253658	268945	255616	289319	291934	275824	261546	273388	253701	**3166843**	Household I	1401	19577	19650	20018	20047	20113	20127	20135	20140	20151	20232	20276	20262	**20061**
Business I	1402	116129	108210	109723	113276	113922	109953	123846	121314	114380	117006	111038	109489	**1368286**	Business I	1402	1705	1703	1703	1704	1709	1710	1713	1715	1717	1719	1723	1726	**1712**
Sport Bodies	1403	1309	1142	1175	1084	1376	1287	1846	2185	3103	1841	1896	1098	**19342**	Sport Bodies	1403	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Industrial	1404	38216	36092	38812	36190	36547	40575	48428	42032	41532	37674	39558	41177	**476833**	Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3114	2839	3158	2936	3073	3641	3116	2783	3112	2668	2509	2611	**35560**	Old Age K-Hu	1414	33	35	35	35	35	35	35	35	35	35	35	35	**35**
Governm./Sc	1415	16255	19601	21982	19461	20720	17874	14007	19432	21024	19414	71058	19145	**279973**	Governm./Sc	1415	89	88	88	88	88	88	88	88	88	88	88	89	**88**
Service Org	1417	3409	2776	2800	2477	2754	3016	2516	2789	2847	2963	2838	2846	**34031**	Service Org	1417	31	31	31	31	31	31	31	31	31	31	31	31	**31**
Municipal Dep.	1418	14566	19225	15363	13059	15757	15043	18199	19359	18208	20536	23094	15131	**207540**	Municipal Dep.	1418	307	307	307	307	307	307	307	281	281	247	247	245	**288**
Bulk Other	1419	2968	3142	3298	3284	3157	2805	3067	3388	2826	2815	2686	2655	**36091**	Bulk Other	1419	112	122	122	122	122	122	122	122	122	122	122	122	**121**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	14526	14993	14636	14895	15561	15435	17032	15480	16270	15961	16177	14257	**185223**	Apartment B	Blok	84	84	84	84	84	83	83	83	83	83	83	83	**83**
GEORGE TOTAL		**589386**	**602426**	**588887**	**594704**	**628771**	**598846**	**674576**	**670589**	**647581**	**632205**	**694199**	**598075**	**7520245**	**GEORGE TOTAL**		**35396**	**35464**	**35506**	**35579**	**35650**	**35674**	**35676**	**35698**	**35741**	**35845**	**35895**	**35922**	**35671**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	113	237	131	144	126	122	154	136	239	236	657	140	**2435**	Uniondale Municipal	1410	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Uniondale Ind Res	1450	3793	5861	3430	3606	7417	5516	7126	6215	5821	6175	5453	4819	**65232**	Uniondale Ind Res	1450	639	639	620	625	626	624	620	615	620	625	624	625	**625**
Uniondale Res	1451	3794	4976	3342	4284	5913	5401	7631	5764	5549	5909	5440	4128	**62131**	Uniondale Res	1451	348	348	367	363	362	364	369	374	369	364	365	365	**363**
Uniondale Bus	1452	1585	2287	2705	2959	2971	2465	3131	3042	3368	3849	3200	3305	**34867**	Uniondale Bus	1452	54	54	54	54	54	54	54	55	55	55	55	55	**54**
Uniondale Schools	1454	215	149	266	302	333	210	208	140	244	197	199	441	**2904**	Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	155	271	135	166	266	208	377	294	234	266	239	316	**2927**	Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**9655**	**13781**	**10009**	**11461**	**17026**	**13922**	**18627**	**15591**	**15455**	**16632**	**15188**	**13149**	**170496**	**UNIONDALE TOTAL**		**1062**	**1062**	**1062**	**1063**	**1063**	**1063**	**1064**	**1065**	**1065**	**1065**	**1065**	**1066**	**1064**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	2325	2651	2331	3033	3334	3141	4418	3793	3149	3414	3421	3035	**38045**	Haarlem Ind Res	1470	248	248	244	259	270	271	273	274	275	276	277	277	**266**
Haarlem Res	1471	2566	2602	2917	2725	2865	2877	3864	2628	2457	2868	2660	2264	**33293**	Haarlem Res	1471	243	242	246	251	240	239	237	236	235	234	233	231	**239**
Haarlem Bus	1472	9	11	13	17	36	15	40	12	25	0	21	4	**203**	Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	177	755	439	239	454	276	530	360	343	660	440	560	**5233**	Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	29	56	11	8	48	2	1	3	8	9	11	4	**190**	Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**5106**	**6075**	**5711**	**6022**	**6737**	**6311**	**8853**	**6796**	**5982**	**6951**	**6553**	**5867**	**76964**	**HAARLEM TOTAL**		**495**	**494**	**494**	**514**	**514**	**514**	**514**	**513**	**514**	**514**	**514**	**512**	**509**
GEORGE MUN TOTAL		**604147**	**622282**	**604607**	**612187**	**652534**	**619079**	**702056**	**692976**	**669018**	**655788**	**715940**	**617091**	**7767705**	**GEORGE MUN TOTAL**		**36953**	**37020**	**37062**	**37156**	**37227**	**37251**	**37254**	**37277**	**37320**	**37424**	**37474**	**37500**	**37243**

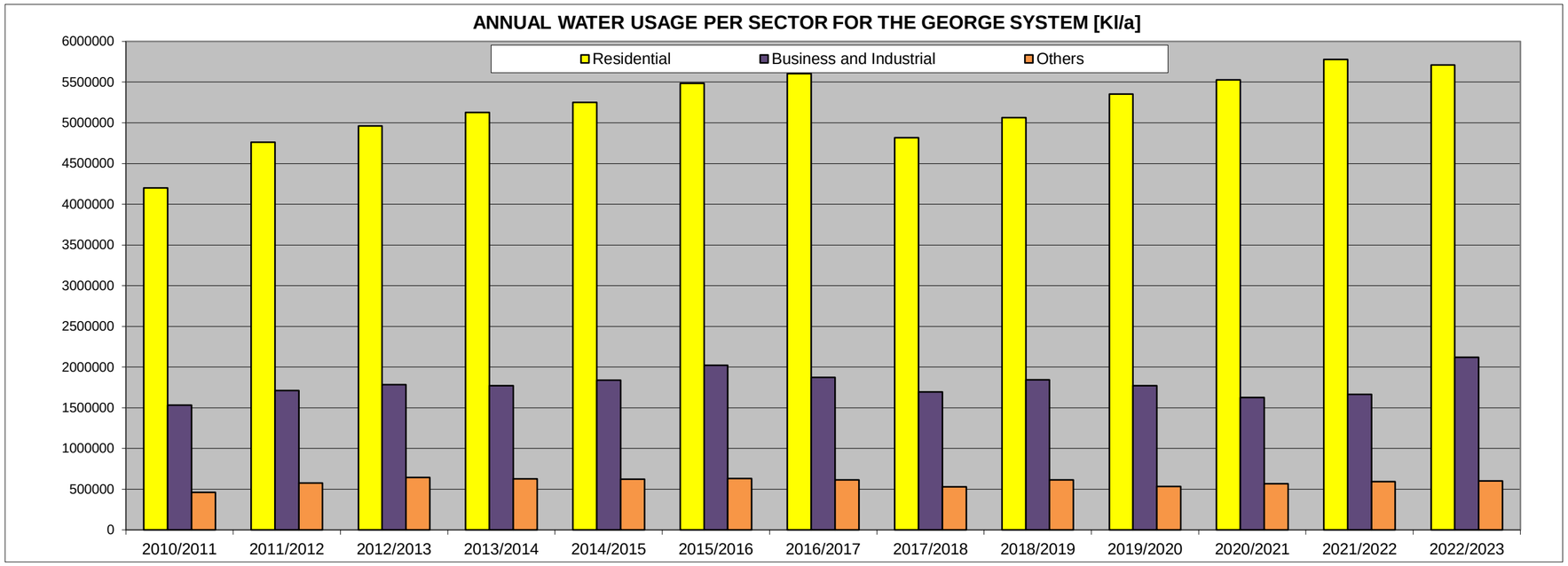
Category	Code	2019/2020													Category	Code	2019/2020												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	144822	144841	142727	143045	144856	133968	163121	151122	146404	132497	142988	143160	**1733551**	Indigent (Masakhane)	1400	13347	13375	13308	13287	13259	13112	13026	13020	12961	12965	13015	12 777	**13121**
Household I	1401	252823	260106	275479	284415	280669	284679	334290	314398	275570	280408	294341	301605	**3438783**	Household I	1401	20307	20324	20472	20522	20589	20774	20900	20932	21040	21039	20993	21228	**20760**
Business I	1402	114380	112635	119170	113595	113319	112481	120424	106040	106051	97677	85665	89951	**1291388**	Business I	1402	1728	1729	1733	1736	1736	1738	1743	1745	1748	1748	1747	1748	**1740**
Sport Bodies	1403	1163	796	1426	1521	1588	1041	1549	2813	1285	1787	1543	1411	**17923**	Sport Bodies	1403	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Industrial	1404	37449	36302	45751	41598	39292	41230	47753	43987	39413	36141	32428	40261	**481605**	Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	2755	2903	3112	3404	3345	3341	3004	2744	3192	2784	3141	3643	**37368**	Old Age K-Hu	1414	35	35	35	35	35	35	35	35	35	35	35	35	**35**
Governm./Sc	1415	15031	19745	17356	21581	20913	17051	14664	18936	22482	16155	11535	16604	**212053**	Governm./Sc	1415	89	89	89	89	89	90	90	91	91	91	91	91	**90**
Service Org	1417	3033	2972	3655	2777	2907	3072	2841	5347	3197	3247	3449	3621	**40118**	Service Org	1417	31	31	31	31	31	31	31	31	31	31	31	31	**31**
Municipal Dep.	1418	18308	14666	18144	16035	16413	15956	17652	18089	14931	15354	12622	16462	**194632**	Municipal Dep.	1418	244	244	244	244	244	244	243	243	244	244	244	244	**244**
Bulk Other	1419	2407	2625	2312	2402	2765	2805	2543	2320	2273	2257	2364	1993	**29066**	Bulk Other	1419	122	123	123	123	123	123	123	123	123	123	123	123	**123**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	14014	14361	15263	15148	14618	16634	17517	15721	14280	14403	14794	14836	**181589**	Apartment B	Blok	82	82	82	82	83	83	83	83	82	82	82	82	**82**
GEORGE TOTAL		**606185**	**611952**	**644395**	**645521**	**640685**	**632258**	**725358**	**681517**	**629078**	**602710**	**604870**	**633547**	**7658075**	**GEORGE TOTAL**		**36005**	**36052**	**36137**	**36169**	**36209**	**36250**	**36294**	**36323**	**36375**	**36378**	**36381**	**36379**	**36246**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	253	136	135	170	138	279	773	196	612	449	178	355	**3674**	Uniondale Municipal	1410	5	5	5	4	4	4	4	4	4	4	4	4	**4**
Uniondale Ind Res	1450	5771	5200	5430	6079	6462	6741	7989	5970	6198	6313	6156	5938	**74247**	Uniondale Ind Res	1450	624	628	627	630	632	632	632	628	623	623	624	622	**627**
Uniondale Res	1451	5580	4672	5281	5808	5678	6148	7467	5380	6177	6159	5336	5918	**69604**	Uniondale Res	1451	366	362	363	360	359	359	359	363	371	371	370	372	**365**
Uniondale Bus	1452	3652	3036	3041	3240	2987	2941	3283	2564	3229	3144	2498	2957	**36572**	Uniondale Bus	1452	55	55	55	55	55	55	55	55	55	55	55	55	**55**
Uniondale Schools	1454	314	344	460	431	561	172	98	304	467	360	102	269	**3882**	Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	306	167	220	265	287	354	387	269	355	336	315	320	**3581**	Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**15876**	**13555**	**14567**	**15993**	**16113**	**16635**	**19997**	**14683**	**17038**	**16761**	**14585**	**15757**	**191560**	**UNIONDALE TOTAL**		**1066**	**1066**	**1066**	**1065**	**1066**	**1066**	**1066**	**1066**	**1069**	**1069**	**1069**	**1069**	**1067**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	2925	3188	3262	3498	3474	4016	4811	3556	3737	3890	3401	3785	**43543**	Haarlem Ind Res	1470	277	276	275	274	276	277	277	277	277	277	278	248	**274**
Haarlem Res	1471	2220	2452	2438	2821	2979	3088	3881	2863	2896	3059	2509	2279	**33485**	Haarlem Res	1471	232	233	235	236	234	234	234	234	234	234	233	233	**234**
Haarlem Bus	1472	3	1	11	10	10	9	2	4	1	4	3	3	**61**	Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	458	459	509	609	456	524	243	377	345	407	376	550	**5313**	Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	7	24	3	1	1	2	3	4	4	4	12	1	**66**	Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**5613**	**6124**	**6223**	**6939**	**6920**	**7639**	**8940**	**6804**	**6983**	**7364**	**6301**	**6618**	**82468**	**HAARLEM TOTAL**		**513**	**513**	**514**	**514**	**514**	**515**	**515**	**515**	**515**	**515**	**515**	**485**	**512**
GEORGE MUN TOTAL		**627674**	**631631**	**665185**	**668453**	**663718**	**656532**	**754295**	**703004**	**653099**	**626835**	**625756**	**655922**	**7932103**	**GEORGE MUN TOTAL**		**37584**	**37631**	**37717**	**37748**	**37789**	**37831**	**37875**	**37904**	**37959**	**37962**	**37965**	**37933**	**37825**

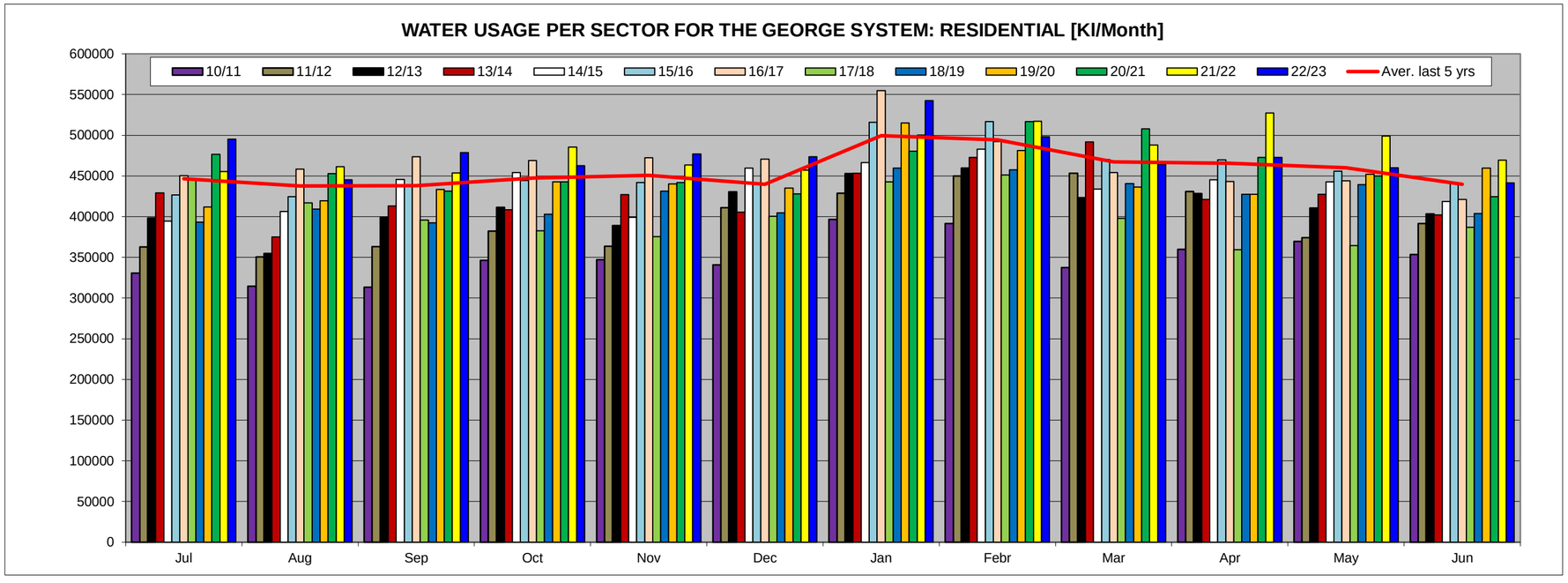
Category	Code	2020/2021													Category	Code	2020/2021												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	154209	149340	139466	143166	132343	124481	141043	154995	156353	150491	140115	149513	**1735515**	Indigent (Masakhane)	1400	12705	12715	12763	12775	11942	11946	12013	12046	12075	12073	12064	12 045	**12264**
Household I	1401	306492	287866	277207	286087	294355	288509	322741	346555	335991	307054	295184	260004	**3608045**	Household I	1401	21356	21348	21394	21384	22256	22252	22199	22236	22256	22306	22325	22351	**21972**
Business I	1402	92465	88084	98589	98295	101057	89004	99914	98411	100402	101229	112001	109209	**1188660**	Business I	1402	1749	1749	1750	1750	1750	1749	1752	1753	1753	1753	1757	1756	**1752**
Sport Bodies	1403	664	638	902	608	677	752	744	12222	948	4248	616	589	**23608**	Sport Bodies	1403	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Industrial	1404	33659	31805	32846	33057	38610	31218	46442	39685	39925	36236	38664	37639	**439786**	Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3367	3106	3493	3281	3450	3520	3720	3316	3411	3466	3386	3721	**41237**	Old Age K-Hu	1414	35	35	35	34	35	35	35	35	35	35	35	35	**35**
Governm./Sc	1415	17415	15458	17131	17785	18696	13742	11771	13227	21841	19218	15322	22160	**203766**	Governm./Sc	1415	91	91	91	91	91	91	91	91	91	91	91	91	**91**
Service Org	1417	3398	2717	2617	3255	3726	3052	3771	3186	2992	2826	2666	3226	**37432**	Service Org	1417	31	31	31	31	31	31	31	31	31	31	31	31	**31**
Municipal Dep.	1418	21311	11765	24569	18140	25618	17329	19075	17826	19861	21568	18698	19633	**235393**	Municipal Dep.	1418	244	244	244	244	244	244	244	244	245	246	246	246	**245**
Bulk Other	1419	1911	1881	1854	1930	2068	1967	2196	2053	2165	2066	2253	2490	**24834**	Bulk Other	1419	123	123	123	123	123	123	122	122	122	122	122	122	**123**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	15982	15854	14567	13629	15026	14765	16370	15338	15646	15095	14528	14964	**181764**	Apartment B	Blok	82	82	82	82	82	82	82	82	82	82	82	82	**82**
GEORGE TOTAL		**650873**	**608514**	**613241**	**619233**	**635626**	**588339**	**667787**	**706814**	**699535**	**663497**	**643433**	**623148**	**7720040**	**GEORGE TOTAL**		**36436**	**36438**	**36533**	**36534**	**36574**	**36573**	**36589**	**36660**	**36710**	**36759**	**36773**	**36779**	**36613**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	367	165	170	152	165	186	212	225	185	186	218	224	**2455**	Uniondale Municipal	1410	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Uniondale Ind Res	1450	5335	5394	5410	5572	5544	5081	5862	6285	5090	9821	5978	6910	**72282**	Uniondale Ind Res	1450	619	619	619	619	618	618	616	617	615	616	605	604	**615**
Uniondale Res	1451	5895	5463	5243	5344	5661	5210	6211	6482	5269	6917	6839	6280	**70814**	Uniondale Res	1451	375	375	375	375	375	375	377	376	378	379	391	392	**379**
Uniondale Bus	1452	3098	2938	2926	2918	3023	2782	3185	3392	2776	2786	3187	3049	**36060**	Uniondale Bus	1452	55	55	55	55	55	55	55	55	55	55	55	55	**55**
Uniondale Schools	1454	278	269	251	251	260	243	278	295	243	243	286	192	**3089**	Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	268	277	254	342	313	287	329	348	287	292	273	264	**3534**	Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**15241**	**14506**	**14254**	**14579**	**14966**	**13789**	**16077**	**17027**	**13850**	**20245**	**16781**	**16919**	**188234**	**UNIONDALE TOTAL**		**1069**	**1069**	**1069**	**1069**	**1068**	**1068**	**1068**	**1068**	**1068**	**1070**	**1071**	**1071**	**1069**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	3647	3458	3052	3595	4345	3429	4025	4297	3509	3507	5109	3640	**45613**	Haarlem Ind Res	1470	277	277	277	277	277	281	281	282	280	280	280	282	**279**
Haarlem Res	1471	2113	2306	2112	2379	2775	2137	2529	2693	2231	2229	3350	2360	**29214**	Haarlem Res	1471	234	234	234	234	234	230	230	229	231	231	230	228	**232**
Haarlem Bus	1472	5	3	9	9	11	7	8	9	7	7	8	8	**91**	Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Schools	1474	425	397	0	0	0	0	0	0	0	0	0	0	**822**	Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	6	5	0	0	1	2	2	2	2	2	72	1	**95**	Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**6196**	**6169**	**5173**	**5983**	**7132**	**5575**	**6564**	**7001**	**5749**	**5745**	**8539**	**6009**	**75835**	**HAARLEM TOTAL**		**515**	**515**	**515**	**515**	**515**	**515**	**515**	**515**	**515**	**514**	**514**	**514**	**515**
GEORGE MUN TOTAL		**672310**	**629189**	**632668**	**639795**	**657724**	**607703**	**690428**	**730842**	**719134**	**689487**	**668753**	**646076**	**7984109**	**GEORGE MUN TOTAL**		**38020**	**38022**	**38117**	**38118**	**38157**	**38156**	**38172**	**38243**	**38293**	**38344**	**38358**	**38364**	**38197**

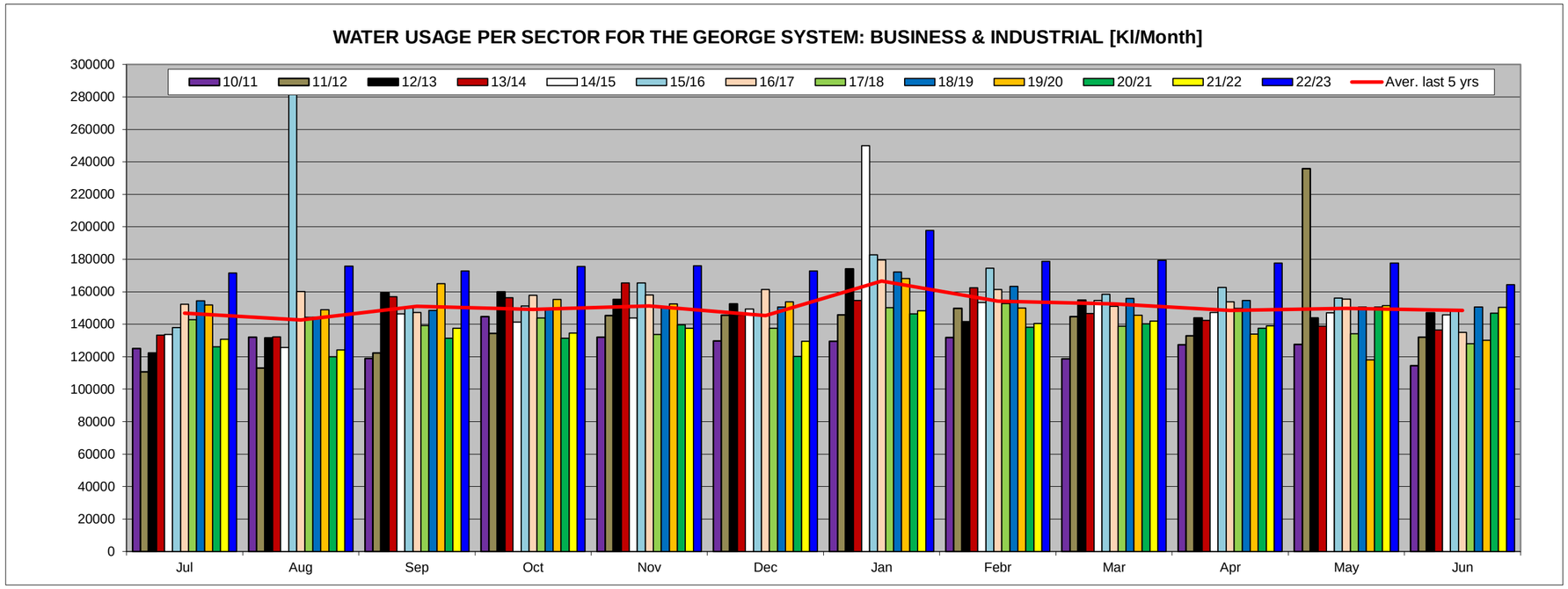
Category	Code	2021/2022													Category	Code	2021/2022												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	TOTAL			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	140367	141697	139939	147291	144269	142957	157833	154321	150843	164284	157591	140811	**1782203**	Indigent (Masakhane)	1400	12045	12099	12148	12136	12131	12124	12197	12113	12120	12220	12119	11 958	**12118**
Household I	1401	300516	304334	298504	322647	304058	300350	326648	347427	323083	346583	325479	312619	**3812248**	Household I	1401	22413	22404	22424	22256	22685	22721	22752	22877	23033	23069	23080	23338	**22754**
Business I	1402	103285	101548	102261	100142	107725	100601	120880	127195	117531	126505	127794	128724	**1364191**	Business I	1402	1761	1764	1761	1759	1756	1755	1935	1975	1973	1976	2018	2020	**1871**
Sport Bodies	1403	632	497	776	614	655	698	1218	1066	1281	1345	1010	883	**10675**	Sport Bodies	1403	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Industrial	1404	31323	41796	39324	35084	46138	45155	54368	48165	53593	50310	59342	47477	**552075**	Industrial	1404	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	3361	3676	3713	4028	4182	3313	3740	3658	2541	3115	3350	3211	**41888**	Old Age K-Hu	1414	35	35	35	35	35	35	35	37	37	37	38	38	**36**
Governm./Sc	1415	15786	15824	17405	17662	22259	15720	13105	24209	26742	33742	31241	25919	**259614**	Governm./Sc	1415	91	91	91	91	91	91	91	92	92	92	91	91	**91**
Service Org	1417	2984	2830	3148	2995	2933	2482	2645	2685	2436	3126	2387	2426	**33077**	Service Org	1417	31	31	31	33	32	32	32	32	32	32	28	28	**31**
Municipal Dep.	1418	17750	17785	24972	17174	27066	17793	19230	18595	16031	16767	14590	14753	**222506**	Municipal Dep.	1418	246	246	246	245	246	245	245	245	208	204	204	204	**232**
Bulk Other	1419	1959	1771	1766	1972	2038	1868	2465	2022	2093	2499	2483	2401	**25337**	Bulk Other	1419	122	122	122	122	122	122	122	122	122	122	129	129	**123**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	14510	15484	15175	15532	15001	13694	15739	15413	14045	16298	15911	15966	**182768**	Apartment B	Blok	82	82	82	82	82	82	82	82	82	82	82	82	**82**
GEORGE TOTAL		**632473**	**647242**	**646983**	**665141**	**676324**	**644631**	**717871**	**744756**	**710219**	**764574**	**741178**	**695190**	**8286582**	**GEORGE TOTAL**		**36846**	**36894**	**36960**	**36779**	**37200**	**37227**	**37511**	**37595**	**37719**	**37854**	**37809**	**37908**	**37359**
UNIONDALE															**UNIONDALE**														
Uniondale Municipal	1410	148	286	315	227	254	146	143	205	147	21	255	231	**2378**	Uniondale Municipal	1410	4	4	4	4	4	4	4	4	4	4	4	4	**4**
Uniondale Ind Res	1450	5219	5030	5451	5357	5405	6339	4102	4164	3409	3689	4031	4132	**56328**	Uniondale Ind Res	1450	604	573	571	588	585	583	357	341	341	359	437	444	**482**
Uniondale Res	1451	5466	5238	5727	6104	5816	6095	7750	8272	6186	6525	6808	6606	**76593**	Uniondale Res	1451	392	423	425	428	428	429	508	499	490	474	572	565	**469**
Uniondale Bus	1452	1968	1477	1814	1799	1920	1535	1819	2381	1896	1982	2212	2526	**23329**	Uniondale Bus	1452	55	55	55	55	55	55	55	56	56	56	69	69	**58**
Uniondale Schools	1454	240	239	223	214	337	258	154	176	134	290	137	273	**2675**	Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	297	243	300	318	208	192	287	333	306	232	129	273	**3118**	Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**13338**	**12513**	**13830**	**14019**	**13940**	**14565**	**14255**	**15531**	**12078**	**12739**	**13572**	**14041**	**164421**	**UNIONDALE TOTAL**		**1071**	**1071**	**1071**	**1091**	**1088**	**1087**	**940**	**916**	**907**	**909**	**1098**	**1098**	**1029**
HAARLEM															**HAARLEM**														
Haarlem Ind Res	1470	3085	2981	3019	1468	4324	4064	1991	2289	1792	1784	1982	2161	**30940**	Haarlem Ind Res	1470	282	259	259	259	259	257	121	121	121	128	133	135	**195**
Haarlem Res	1471	1946	2718	2365	1381	3580	2763	4709	5367	4286	4201	4403	4848	**42567**	Haarlem Res	1471	228	251	251	250	250	249	370	367	368	363	376	374	**308**
Haarlem Bus	1472	7	8	8	6	8	6	0	23	7	3	15	15	**106**	Haarlem Bus	1472	1	1	1	1	1	1	1	1	1	1	3	3	**1**
Haarlem Schools	1474	0	468	439	411	439	430	441	437	10	9	18	158	**3260**	Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	1	2	3	2	4	4	5	20	10	9	9	14	**83**	Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**5039**	**6177**	**5834**	**3268**	**8355**	**7267**	**7146**	**8136**	**6105**	**6006**	**6427**	**7196**	**76956**	**HAARLEM TOTAL**		**514**	**514**	**514**	**513**	**513**	**510**	**495**	**492**	**493**	**495**	**515**	**515**	**507**
GEORGE MUN TOTAL		**650850**	**665932**	**666647**	**682428**	**698619**	**666463**	**739272**	**768423**	**728402**	**783319**	**761177**	**716427**	**8527959**	**GEORGE MUN TOTAL**		**38431**	**38479**	**38545**	**38383**	**38801**	**38824**	**38946**	**39003**	**39119**	**39258**	**39422**	**39521**	**38894**

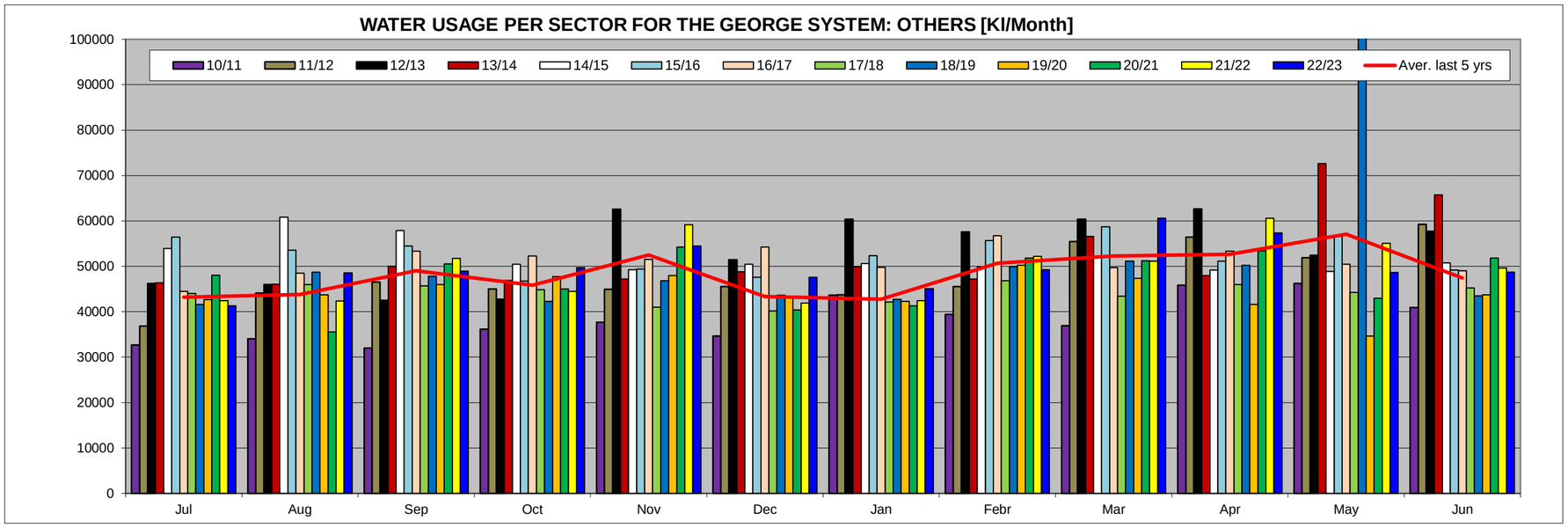
Category	Code	2022/2023												TOTAL
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	155837	137093	123488	117347	117119	120258	135881	127053	117675	122041	113112	100355	**1487259**
Household I	1401	324379	293671	345774	345379	359684	353386	406609	370906	346753	350783	347117	340967	**4185408**
Business I	1402	118094	123216	117188	118470	120273	118481	135707	124666	122254	121531	116693	107451	**1444024**
Sport Bodies	1403	855	690	731	925	1102	1330	990	779	820	848	654	540	**10264**
Industrial	1404	53454	52622	55604	56688	55428	53984	61567	53508	56655	55693	60512	56430	**672145**
Bed & Breakfast	1405	0	0	0	354	355	298	528	479	388	403	362	399	**3566**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	1363	3759	4239	3752	3566	3988	3805	3510	3985	3987	4099	3519	**43572**
Governm./Sc	1415	20775	24438	23560	22746	27835	19635	16019	21924	26738	29294	22691	22199	**277854**
Service Org	1417	2840	2778	3004	2692	3039	2795	3115	2938	3140	3196	3203	3049	**35789**
Municipal Dep.	1418	12859	14586	14571	17058	15990	16988	18503	16748	23363	17538	15077	16831	**200112**
Bulk Other	1419	2581	2344	2803	2550	2951	2823	2648	3320	2582	2442	2917	2573	**32534**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	15145	14367	9282	0	0	0	0	0	0	0	0	0	**38794**
GEORGE TOTAL		**708182**	**669564**	**700244**	**687961**	**707342**	**693966**	**785372**	**725831**	**704353**	**707756**	**686437**	**654313**	**8431321**
UNIONDALE														
Uniondale Municipal	1410	31	130	15	184	76	62	84	172	190	187	181	292	**1604**
Uniondale Ind Res	1450	3754	4645	4272	4014	4548	4918	4988	5102	4463	4544	4037	4018	**53303**
Uniondale Res	1451	5777	6948	6185	7017	7780	7544	7186	6910	6837	6623	6695	8007	**83509**
Uniondale Bus	1452	1880	2249	1972	2228	2684	2703	2571	2672	2570	2555	2372	2490	**28946**
Uniondale Schools	1454	153	154	293	292	293	321	302	211	127	223	262	239	**2870**
Uniondale Churches	1455	86	204	69	165	292	263	134	325	213	250	199	230	**2430**
UNIONDALE TOTAL		**11681**	**14330**	**12806**	**13900**	**15673**	**15811**	**15265**	**15392**	**14400**	**14382**	**13746**	**15276**	**172662**
HAARLEM														
Haarlem Ind Res	1470	1929	2170	1383	1767	2038	1948	2341	1955	2050	1952	1795	1884	**23212**
Haarlem Res	1471	4434	4881	4456	5328	5628	5318	5746	5572	6841	4872	4981	5582	**63639**
Haarlem Bus	1472	15	17	8	15	21	13	18	20	16	22	17	18	**200**
Haarlem Schools	1474	126	145	143	153	147	148	149	148	148	148	148	148	**1751**
Haarlem Churches	1475	11	11	7	11	9	18	18	10	11	14	12	13	**145**
HAARLEM TOTAL		**6515**	**7224**	**5997**	**7274**	**7843**	**7445**	**8272**	**7705**	**9066**	**7008**	**6953**	**7645**	**88947**
GEORGE MUN TOTAL		**726378**	**691118**	**719047**	**709135**	**730858**	**717222**	**808909**	**748928**	**727819**	**729146**	**707136**	**677234**	**8692930**

Category	Code	2022/2023												AVERAGE
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar	Apr	May	Jun	
Indigent (Masakhane)	1400	12040	12022	10120	10159	10184	10348	10390	10353	10359	10334	10115	9 294	**10477**
Household I	1401	23330	23330	25380	25480	25567	25457	25430	25516	25555	25617	25887	26780	**25277**
Business I	1402	2019	2019	2020	1990	1989	2000	1999	2003	2005	2005	2008	2007	**2005**
Sport Bodies	1403	16	16	16	16	16	16	15	15	15	15	15	15	**16**
Industrial	1404	4	4	5	5	5	5	5	5	5	5	5	5	**5**
Bed & Breakfast	1405	0	0	0	7	7	8	8	8	8	8	9	9	**6**
Household N	1406	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buitestedel	1413	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Old Age K-Hu	1414	38	40	40	40	40	40	40	40	41	41	41	41	**40**
Governm./Sc	1415	91	90	90	89	89	89	89	89	89	89	89	88	**89**
Service Org	1417	28	28	28	28	28	28	28	28	28	28	28	28	**28**
Municipal Dep.	1418	204	204	205	205	205	205	205	205	205	205	205	205	**205**
Bulk Other	1419	130	129	130	130	130	130	130	130	131	131	131	131	**130**
Herolds Bay	1422	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Apartment B	Blok	82	82	68	0	0	0	0	0	0	0	0	0	**19**
GEORGE TOTAL		**37982**	**37964**	**38102**	**38149**	**38260**	**38326**	**38339**	**38392**	**38441**	**38478**	**38533**	**38603**	**38297**
Uniondale Municipal	1410	4	4	4	4	4	4	4	5	5	5	5	5	**4**
Uniondale Ind Res	1450	441	442	408	411	410	423	431	431	434	437	447	382	**425**
Uniondale Res	1451	569	568	599	596	597	584	577	576	573	571	561	626	**583**
Uniondale Bus	1452	69	69	69	69	69	69	69	69	69	69	69	69	**69**
Uniondale Schools	1454	2	2	2	2	2	2	2	2	2	2	2	2	**2**
Uniondale Churches	1455	14	14	14	14	14	14	14	14	14	14	14	14	**14**
UNIONDALE TOTAL		**1099**	**1099**	**1096**	**1096**	**1096**	**1096**	**1097**	**1097**	**1097**	**1098**	**1098**	**1098**	**1097**
Haarlem Ind Res	1470	137	137	117	117	118	127	127	127	130	129	129	119	**126**
Haarlem Res	1471	372	372	391	391	392	383	383	383	380	381	381	391	**383**
Haarlem Bus	1472	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Haarlem Schools	1474	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Haarlem Churches	1475	2	2	2	2	2	2	2	2	2	2	2	2	**2**
HAARLEM TOTAL		**515**	**515**	**514**	**514**	**516**	**516**	**516**	**516**	**516**	**516**	**516**	**516**	**516**
GEORGE MUN TOTAL		**39596**	**39578**	**39712**	**39759**	**39872**	**39938**	**39952**	**40005**	**40054**	**40092**	**40147**	**40217**	**39910**


ANNUAL WATER USAGE PER SECTOR FOR THE GEORGE SYSTEM [Kl/a]
Residential
Business and Industrial
Others
6000000
5500000
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
2010/2011
2011/2012
2012/2013
2013/2014
2014/2015
2015/2016
2016/2017
2017/2018
2018/2019
2019/2020
2020/2021
2021/2022
2022/2023


WATER USAGE PER SECTOR FOR THE GEORGE SYSTEM: RESIDENTIAL [Kl/Month]
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20
20/21
21/22
22/23
Aver. last 5 yrs
600000
550000
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Febr
Mar
Apr
May
Jun


WATER USAGE PER SECTOR FOR THE GEORGE SYSTEM: BUSINESS & INDUSTRIAL [Kl/Month]
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20
20/21
21/22
22/23
Aver. last 5 yrs
300000
280000
260000
240000
220000
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Febr
Mar
Apr
May
Jun


WATER USAGE PER SECTOR FOR THE GEORGE SYSTEM: OTHERS [Kl/Month]
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20
20/21
21/22
22/23
Aver. last 5 yrs
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Febr
Mar
Apr
May
Jun

GEORGE MUNICIPALITY
George and Wilderness distribution systems

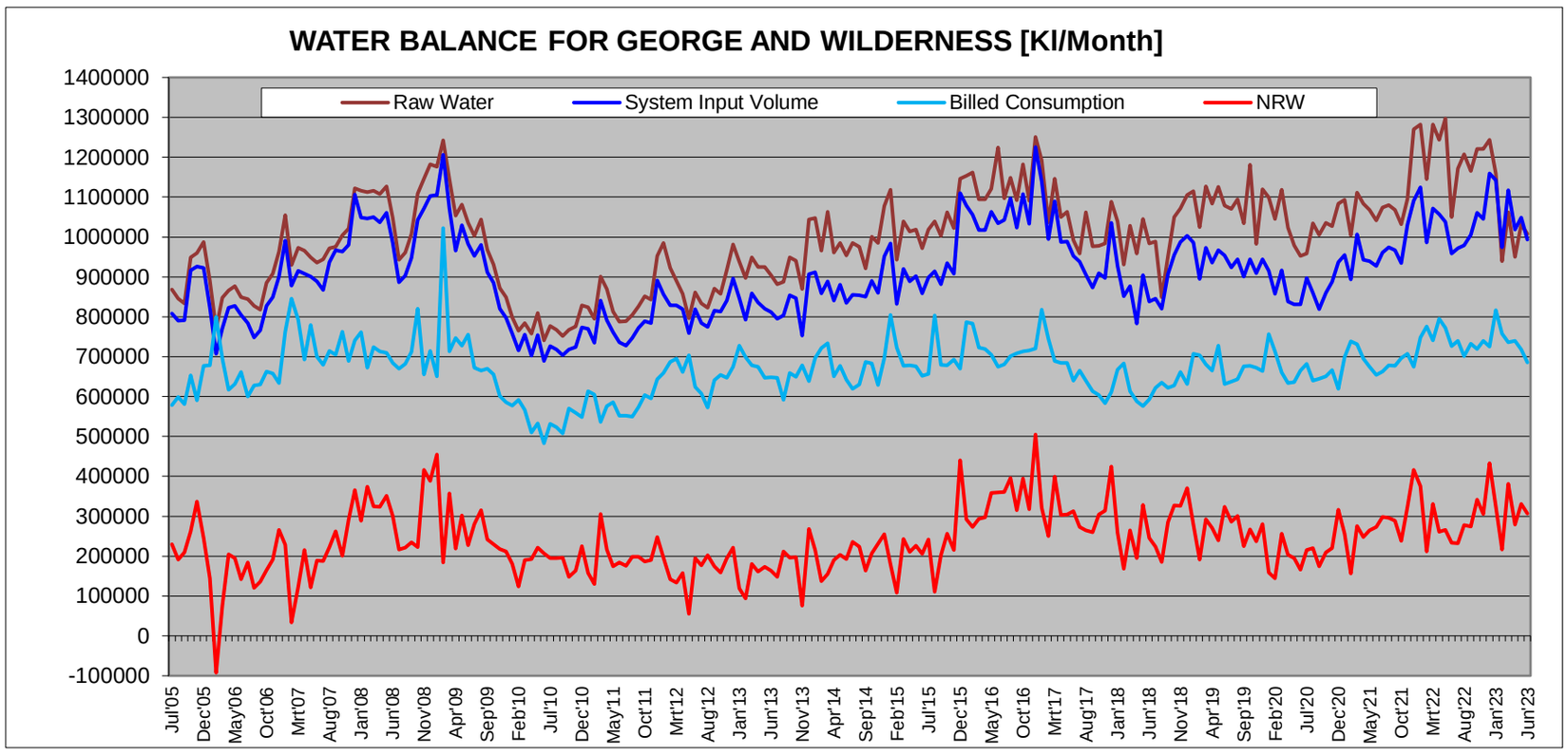
Month	Year	BULK WATER SUPPLY																	TREATED WATER SUPPLY											
		Raw Water Supply					System Input Volume								Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)								
		R1 - Old WTP	R2 - New WTP	R3 - Touw River	Boreholes	Total	B1 - Industrial	B2 - Central	B3 - Glen Barrie (Blanco 2)	B4 - Blanco 1	B5 - Palotti	B6 - Caledon	B7 - S/Veld	B8 - W/Ness	Total	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Unmetered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
Jan'03	02/03	172388	712060	27480		**911928**	584602	12883		95222	54334	86110	7275	39732	**879958**	31970	3.5	225752	4.5%	879958											
Feb'03		147865	661214	42170		**851249**	526317	14610		91673	49023	83110	3892	40132	**808757**	42492	5.0			808757											
Mr'03		132079	733923	36730		**902732**	575200	10537		88769	37798	85170	4768	34179	**836421**	66311	7.3			836421											
Apr'03		40810	724016	0		**764826**	546192	8372	12100	48500	46894	64760	2688	0	**729506**	35320	4.6			729506											
May'03		43559	733930	14740		**792229**	536568	4115	11687	49512	39574	85190	7046	31299	**764991**	27238	3.4			764991											
Jun'03		9423	712560	28900		**750883**	471352	3182	16327	69106	47298	71430	7189	42578	**728462**	22421	3.0			728462											
Jul'03		55564	726345	27930		**811839**	511036	4229	17124	70764	48290	71510	5043	35101	**763097**	48742	6.0			763097											
Aug'03		58126	732675	25760		**816561**	511387	25693	18839	74323	41817	70610	6311	32306	**781286**	35275	4.3			781286											
Sep'03		120757	701618	30740		**853115**	467819	24079	19183	77286	52168	96970	7078	40992	**785575**	67540	7.9			785575											
Oct'03		154560	724563	34000		**913223**	539068	6719	21014	85503	54530	102070	6438	46912	**862254**	50969	5.6			862254											
Nov'03		182464	713299	30490		**926253**	567699	12725	32115	87863	55367	91890	6022	41636	**895317**	30936	3.3			895317											
Dec'03	03/04	244578	736163	39680		**1020421**	614940	12484	26299	108189	61505	96730	2399	53637	**976183**	44238	4.3	572320	5.4%	976183											
Jan'04		222169	740794	31790		**994753**	602624	21500	26242	100693	58125	95510	2572	40516	**947782**	46971	4.7			947782											
Feb'04		156046	693526	33750		**883322**	547176	12370	21394	85817	50143	86730	3464	35594	**842688**	40634	4.6			842688											
Mr'04		135440	735107	31320		**901867**	544777	16432	20608	83002	52001	90560	3603	36570	**847493**	54374	6.0			847493											
Apr'04		104598	710089	25380		**840067**	518325	14720	16219	79737	50138	80490	3797	32468	**796894**	44173	5.3			796894											
May'04		90306	738845	28780		**857931**	521440	8265	19912	81103	50371	88710	3237	31419	**804457**	53474	6.2			804457											
Jun'04		76171	711510	24210		**811891**	494951	17042	18879	76397	48574	70420	2901	27733	**756897**	54994	6.8			756897											
Jul'04		56462	740713	34850		**832025**	518984	12473	18597	75539	50689	56640	3252	30304	**766478**	65547	7.9			766478											
Aug'04		95756	719422	30386		**845564**	523141	14597	20413	83497	53904	49480	3837	26423	**775292**	70272	8.3			775292											
Sep'04		79462	705842	32109		**817413**	511464	12330	19534	79314	48052	39230	5457	27921	**743302**	74111	9.1			743302											
Oct'04		87985	743902	37573		**869460**	450646	68075	23656	98174	51095	77670	6028	32673	**808017**	61443	7.1			808017											
Nov'04		190638	722696	43148		**956482**	578331	8495	28536	118920	60592	64540	5385	37520	**902319**	54163	5.7			902319											
Dec'04	04/05	105045	742700	39801		**887546**	577391	6224	22732	93406	51283	60500	5842	34610	**851988**	35558	4.0	788215	7.6%	851988											
Jan'05		208244	740324	32800		**981368**	564910	8118	26181	105916	49726	54730	6644	26540	**842765**	138603	14.1			842765											
Feb'05		97267	659777	34680		**791724**	476989	6109	25181	103426	45797	47530	5472	31210	**741714**	50010	6.3			741714											
Mr'05		102884	743353	38670		**884907**	532479	9116	29149	119231	53034	50190	5090	35010	**833299**	51608	5.8			833299											
Apr'05		71698	715883	35181		**822762**	494040	7963	25682	105326	47248	47520	7017	33190	**767986**	54776	6.7			767986											
May'05		82701	732578	29945		**845224**	488904	20599	26577	109402	47107	56920	6734	28250	**786493**	58731	6.9			786493											
Jun'05		89907	706598	28514		**825019**	463250	19722	25436	104726	46809	55440	9343	26900	**751626**	73393	8.9			751626											
Jul'05		106935	722103	38870		**867908**	503704	16417	27177	112013	51357	53810	7320	36500	**808298**	59610	6.9			808298	528372	50175	229751	28.4%			0	53547	176204	21.8%		
Aug'05		95912	718944	30900		**845756**	497733	12768	26794	110176	53328	52830	7379	29020	**790028**	55728	6.6			790028	548330	50175	191523	24.2%			0	53510	138013	17.5%		
Sep'05		96296	704475	33090		**833861**	474299	27611	28030	115104	51510	53180	10094	31070	**790898**	42963	5.2			790898	531342	50175	209381	26.5%			0	53512	155869	19.7%		
Oct'05		173793	734034	40680		**948507**	568199	9317	33254	136556	64190	60260	6057	38200	**916033**	32474	3.4			916033	603261	50175	262597	28.7%			0	53762	208835	22.8%		
Nov'05		232974	692305	34450		**959729**	588625	16323	31179	129529	57593	60220	10738	32500	**926707**	33022	3.4			926707	540024	50175	336508	36.3%			0	53783	282725	30.5%		
Dec'05		213195	732973	41500		**987668**	572218	10566	32937	138364	63809	60640	4729	39150	**922413**	65255	6.6	634896	6.0%	922413	627310	50175	244928	26.6%	2145286	21.7%	0	53775	191153	20.7%	1502309	15.2%
Jan'06		119145	734626	36650		**890421**	521762	12900	28902	121856	44999	53520	4482	34410	**822831**	67590	7.6			822831	628234	50175	144422	17.6%			0	53576	90846	11.0%		
Feb'06		103962	634683	30900		**769545**	459377	10308	25598	103769	42860	33360	2983	29020	**707275**	62270	8.1			707275	749410	50175	-92310	-13.1%			0	53345	-145655	-20.6%		
Mr'06		109334	706537	31630		**847501**	510669	10700	28519	102700	48933	34980	4360	29700	**770481**	77020	9.1			770481	644461	50175	75845	9.8%			0	53471	22374	2.9%		
Apr'06		123278	712971	29630		**865879**	528814	16762	25176	113304	45754	57430	7544	27820	**822604**	43275	5.0			822604	567407	50175	205022	24.9%			0	53575	151447	18.4%		
May'06		110946	723254	42890		**877090**	505267	20337	22896	121010	43295	66370	11942	35800	**826917**	50173	5.7			826917	581477	50175	195265	23.6%			0	53584	141681	17.1%		
Jun'06		93245	706826	49650		**849721**	497060	19935	23731	121280	49348	58020	3511	31320	**804205**	45516	5.4			804205	611676	50175	142354	17.7%			0	53539	88816	11.0%		
Jul'06		77528	721029	45840		**844397**	475365	20702	4185	132556	64060	52400	4471	30000	**783740**	60657	7.2			783740	550959	48735	184046	23.5%			0	53047	130999	16.7%		
Aug'06		115429	710445	1720		**827584**	493125	15795	354	115295	59575	54260	9476	0	**747880**	79714	9.6			747880	578790	48735	120355	16.1%			0	52976	67379	9.0%		
Sep'06		116644	694509	7050		**818203**	470120	16085	0	125775	49390	53650	7790	33790	**756600**	51603	6.3			756600	582056	48735	125809	17.7%			0	53013	82796	10.8%		
Oct'06		138157	716781	29820		**884758**	524774	20400	0	138157	51350	58190	6496	28000	**827367**	57391	6.5			827367	613474	48735	165158	20.0%			0	53135	112023	13.5%		
Nov'06		177541	696095	34210		**907846**	530248	19970	0	151319	50620	61600	3093	32120	**849970**	58876	6.5			849970	609329	48735	190906	22.5%			0	53178	137728	16.2%		
Dec'06		212446	719124	31500		**963070**	565967	21065	0	161266	55817	65110	1793	29580	**900598**	62472	6.5			900598	585539	48735	266334	29.6%			0	53281	213043	23.7%		
Jan'07		304818	729774	20050		**1056642**	642731	30340	0	154644	59826	79570	5105	18920	**911436**	63206	6.0	695436	6.3%	911436	714315	48735	228386	23.0%	1972135	19.0%	0	53463	174923	17.6%	1333660	12.9%
Feb'07		252889	656613	20190		**929692**	572355	18945	115	137787	54057	72920	3301	19050	**878530**	51162	5.5			878530	796226	48735	33569	3.8%			0	53237	-19668	-2.2%		
Mr'07		228158	720964	23710		**972832**	585572	22310	10250	132823	56227	79720	7171	20800	**914873**	57959	6.0			914873	743964	48735	122174	13.4%			0	53310	68864	7.5%		
Apr'07		255590	691259	18980		**965829**	597606	24355	6	122060	55219	80920	5872	17903	**907941**	57888	6.0			907941	644086	48735	215120	23.7%			0	53296	161824	17.8%		
May'07		219779	710036	18980		**948795**	600480	21015	1371	118853	55627	76780	9198	17904	**901228**	47567	5.0			901228	730912	48735	121581	13.5%			0	53282	68299	7.6%		
Jun'07		214917	702895	17420		**935232**	594704	20100	612	135212	52945	64460	3828	16430	**888291**	46941	5.0			888291	650849	48735	188707	21.2%			0	53257	135450	15.2%		
Jul'07		180187	748074	15995		**944256**	572052	21105	235	132450	51830	71450	3252	19035	**867409**	76847	8.1			867409	632430	47295	187684	21.6%			0	52765	134919	15.6%		
Aug'07		218945	737062	16238		**972245**	598881	22203	33200	135141	52125	75870	3662	15264	**936346**	35899	3.7			936346	666912	47295	222139	23.7%			0	52903	169236	18.1%		
Sep'07		231175	724737	19926		**975838**	601816	21984	36310	153716	53416	75720	5852	18730	**967544**	8294	0.8			967544	657641	47295	262608	27.1%			0	52965	209643	21.7%		
Oct'07		251688	731664	20398		**1003750**	549317	25632	92515	128146	55121	85510	8423	19174	**963838**	39912	4.0			963838	715233	47295	201310	20.9%			0	52958	148352	15.4%		
Nov'07		290834	712126	18043		**1021003**	620322	21340	52406	118531	54874	88280	8068	16960	**980781**	40222	3.9			980781	642048	47295	291438	29.7%			0	52992	238447	24.3%		
Dec'07		354512	737328	29830		**1121670**	655788	23623	36281	200963	55725	93430	13220	28040	**1107070**	14600	1.3	617751	4.9%	1107070	694178	47295	365597	33.0%	3492732	29.0%	0	53244	313353	28.2%	2856273	23.7%
Jan'08		368520	726090	18329		**1116139**	505632	21465	98478	28252	90300	33728	51350	4805	**1049170**	66969	6.0			1049170	713799	47295	288076	27.5%			0	53128	234948	22.4%		
Feb'08		362480	724345	26295		**1113120**	608774	22785	49100	192424	55194	88040	5299	24717	**1046333**	66787	6.0			1046333	624640	47295	374398	35.8%			0	53123	321276	30.7%		
Mr'08		360140	720160	36161		**1116461**	613698	22964	54102	186425	54969	75180	8144	33991	**1049473**	66988	6.0			1049473	677202	47295	324976	31.0%			0	53129	271847	25.9%		
Apr'08		361000	711810	35365		**1108175**	611759	23010	49937	180692	56205	74440	8213	33243	**1033320**	71855	6.5			1033320	665520	47295	323505	31.2%			0	53103	270402	26.1%		
May'08		370240	725670	31295		**1127205**	618812	24014	58200	201013	55626	67030	6556	29417	**1060668**	66537	5.9			1060668	662751	47295	350622	33.1%			0	53151	297471	28.0%		
Jun'08		319507	708840	19038		**1047385**	591085	22121	54279	174386	52389	66230	6156	17896	**984542**	62843	6.0			984542	636870	47295	300377	30.5%			0	52999	247378	25.1%		
Jul'08		210148	709696	22830		**942674**	569674	20134	39372	143427	47233	60170	4642	21460	**886112**	56562	6.0			886112	623891	45855	216366	24.4%			0	52352	164014	18.5%		
Aug'08		249645	694241	17650		**961536**	578089	22063	32743	151561	45670	51330	5857	16591	**903844**	57692	6.0			903844	636176	45855	221813	24.5%			0	52398	169425	18.7%		
Sep'08		272901	712800	22205		**1007906**	573056	22588	40340	170440	46215	67670	6250	20873	**947432**	60474	6.0			947432	666573	45855	235004	24.8%			0	52475	182529	19.3%		
Oct'08		336380	743094	29714		**1109188**	595224	44292	43796	236156	45377	44240	5620	27931	**1042636**	66552	6.0			1042636	774721	45855	222060	21.3%			0	52665	169395	16.2%		
Nov'08		387934	730304	23004		**1145881**	682697	50546	45812	135897	51768	57700	6120	31024	**1071564**	74317	6.5			1071564	669575	45855	416134	38.8%			0	52723	363411	33.9%		
Dec'08	08/09	407282	739022	36488		**1182792**	699170	65393	54971	127068	54933	60950	5870	34299	**1102654**	80138	6.8	769666	5.9%	1102654	668118	45855	388681	35.2%	3443518	28.0%	0	52785	335895	30.5%	2811929	22.8%
Jan'09		385486	749952	40796		**1176234**	688217	67247	58330	135062	55276	59060	4120	38348	**1105660**	70574	6.0			1105660	605410	45855	454395	41.1%			0	52791	401604	36.3%		
Feb'09		434785	776736	30875		**1242396**	755739	58071	45878	201776	59439	50760	5935	29023	**1206621**	35776	2.9			1206621	976447	45855	184319	15.3%			0	52993	131325	10.9%		
Mr'09		342328	763344	39797		**1145469**	630725	58685	68375	175112	31796	62980	6130	37409	**1071212**	74257	6.5			1071212	667803	45855	357554	33.4%			0	52722	304832	28.5%		
Apr'09		288595	728966	39046		**1053607**	535378	68222	42725	181707	35260	62870	5250	33883	**965295**	88312	8.4			965295	701043	45855	218397	22.6%			0	52511	165887	17.2%		
May'09		290292	751434	39493		**1081219**	604099	68900	44138	165200	36117	69480	5315	37123	**1029372**	51847	4.8			1029372	681848	45855	301669	29.3%			0	52639	249031	24.2%		
Jun'09		252790	758010	24667		**1035467**	574895	70690	40876	164215	35843	66890	5705	23187	**982301**	53166	5.1			982301	709320	45855	227126	23.1%			0	52545	174581	17.8%		
Jul'09		278089	686110	38860		**1003059**	545957	67105	19413	181415	35742	63160	3454	36528	**952774**	50285	5.0			952774	628225	44415	280134	29.4%			0	52036	228099	23.9%		
Aug'09		294638	713490	36305		**1044433**	573491	25	20381	201380	36338	68740	5872	34127	**980211**	64222	6.1			980211	620520	44415	315276	32.2%			0	52090	263185	26.8%		
Sep'09		209990	723320	34304		**967614**	495742	65301	40	198243	33148	80110	6594	32246	**911424**	56190	5.8			911424	625709	44415	241300	26.5%			0	51953	189347	20.8%		
Oct'09		205186	693450	31768		**930404**	472874	59836	62	189874	33568	90580	8707	29862	**885363**	45041	4.8			885363	610872	44415	230076	26.0%			0	51901	178175	20.1%		
Nov'09		197656	641780	32724		**872160**	421709	57259	10745	162360	33531	94379	9087	30761	**818831**	52329	6.0			818831	557451	44415	217965	26.6%			0	51770	166195	20.3%		
Dec'09	09/10	166057	642640	39867		**849564**	409459	53349	36675	131495	34385	94010	6811	37475	**797659**	50905	6.0	598353	5.8%	797659	541720	44415	211524	26.5%	2611299	26.9%	0	51725	150799	20.0%	1990293	20.5%
Jan'10		135551	623360	39231		**798142**	409152	41562	31203	110465	34412	90030	4141	36877	**757842**	40300	5.0			757842	532458	44415	180969	23.9%			0	51646	129323	17.1%		
Feb'10		156761	577350	30885		**764996**	409065	39962	30240	96357	31392	74130	5247	29032	**715425**	49571	6.5			715425	547101	44415	123909	17.3%			0	51561	72348	10.1%		
Mr'10		118184	630980	34996		**784160**	401801	76100	30416	92794	33365	85000	3520	32896	**758892**	26268	3.6			758892	521492	44415	189985	25.1%			0	51642	138343	18.3%		
Apr'10		95341	631220	31045		**757606**	343932	90386	30830	90643	33593	81720	2463	29182	**702749**	54857	7.2			702749	466108	44415	192226	27.4%			0	51535	140690	20.0%		
May'10		130659	650490	28308		**809457**	375960	97051	31467	91924	38753	89780	3096	26610	**754641**	54816	6.8			754641	488686	44415	221539	29.4%			0	51639	169900	22.5%		
Jun'10		73488	638320	29021		**740829**	352145	70508	30364	88716	37279	80700	2269	27280	**689261**	51568	7.0			689261	438449	44415	206397	29.9%			0	51509	154888	22.5%		
Jul'10		77199	672340	27071	0	**776610**	363323	84942	32810	94730	38471	83950	2593	25447	**726266**	50344	6.5			726266	488255	42975	195036	26.9%			0	51133	143903	19.8%		
Aug'10		62872	676000	29010	0	**767882**	351284	90750	31065	92455	37950	83710	3631	27269	**718114**	49768	6.5			718114	480476	42975	194663	27.1%			0	51116	143547	20.0%		
Sep'10		54554	667200	30286	0	**752040**	327239	96096	32051	92754	36774	86770	3156	28469	**703309**	48731	6.5			703309	464140	42975	196194	27.9%			0	51087	145107	20.6%		
Oct'10		34998	675200	29405	27645	**767248**	354057	90078	30412	95347	33738	81990	4261	27641	**717524**	49724	6.5			717524	527121	42975	147427	20.5%			0	51115	96312	13.4%		
Nov'10		91970	615300	34060	34688	**776018**	333927	110196	23184	76891	39270	103160	5247	32016	**723891**	52127	6.7			723891	516820	42975	164097	22.7%			0	51128	112969	15.6%		
Dec'10		94184	683600	32762	18338	**828884**	366146	107570	31542	94219	36403	102980	3237	30796	**772781**	54103	6.8			772781	504914	42975	224892	29.1%			0	51226	173667	22.5%		
Jan'11		115828	671100	37341	0	**824269**	376473	55176	34639	104375	43625	116280	4265	35101	**769934**	54335	6.6			769934	569888	42975	157070	20.4%			0	51220	105851	13.7%		
Feb'11		145631	622200	27517	0	**795348**	366789	109711	30247	98742	27816	69590	6350	25866	**735111**	60237	7.6			735111	562497	42975	129639	17.6%			0	51150	78489	10.7%		
Mr'11		192071	673900	35394	0	**901365**	428327	119748	35633	103412	34839	82020	3971	33270	**841220**	60145	6.7			841220	492938	42975	305308	36.3%			0	51362	253845	30.2%		
Apr'11		183982	655900	29348	0	**869230**	422316	102695	33626	100537	30499	70120	4499	27587	**791879**	77351	8.9			791879	532870	42975	216034	27.3%			0	51264	164770	20.8%		
May'11		125228	670400	18008	0	**813636**	416103	96131	34126	99841	30463	63450	3798	16928	**760840**	52796	6.5			760840	543316	42975	174549	22.9%			0	51202	123347	16.2%		
Jun'11		117054	665200	5398	0	**787652**	404491	97385	32486	101342	30026	62470	3207	5074	**736481**	51171	6.5			736481	508907	42975	184599	25.1%			0	51153	133447	18.1%		
Jul'11		130059	658400	380	0	**788839**	402403	93809	30271	98914	30694	67660	3458	357	**727566**	61273	7.8			727566	510146	41535	175885	24.2%			0	50481	125404	17.2%		
Aug'11		147567	655110	2026	0	**804703**	418057	103514	30440	92127	31257	65950	4158	1904	**747407**	57296	7.1			747407	507636	41535	198236	26.5%			0	50521	147716	19.8%		
Sep'11		166568	632990	26390	0	**825948**	424040	101110	30521	86724	30538	70700	3954	24542	**772129**	53819	6.5			772129	532047	41535	198547	25.7%			0	50570	147977	19.2%		
Oct'11		176580	651900	23161	0	**851641**	429022	116764	32525	85140	31418	70210	3644	21771	**789494**	62147	7.3			789494	564461	41535	186281	23.6%			0	50605	135676	17.2%		
Nov'11	11/12	202578	615100	25937	0	**843615**	423545	105440	33274	86099	31461	75170	5779	23862	**784630**	58985	7.0	759611	7.3%	784630	553635	41535	189460	24.1%	2074721	21.6%	0	50595	138865	17.7%	1467165	15.2%
Dec'11		245738	672300	34839	0	**952877**	530606	104900	34813	84330	31873	68320	3707	32574	**891123**	61754	6.5			891123	602094	41535	247494	27.8%			0	50808	196686	22.1%		
Jan'12		266144	683400	35947	0	**985491**	458426	104717	35820	100351	31742	87730	3759	33430	**859975**	129616	13.1			859975	618162	41535	196278	22.9%			0	50738	140540	17.0%		
Feb'12		230551	664250	27665	0	**922466**	479151	94237	32729	81396	29496	66270	19089	25866	**828234**	94232	10.2			828234	645172	41535	141527	17.1%			0	50682	90845	11.0%		
Mr'12		157104	708450	24863	0	**890417**	466372	109681	32643	88548	29660	74100	3961	23172	**828137**	62280	7.0			828137	653348	41535	133254	16.1%			0	50682	82572	10.0%		
Apr'12		142261	692200	23438	0	**857899**	351371	110964	33104	172491	61173	64050	3757	22313	**819223**	39676	4.5			819223	620285	41535	157403	19.2%			0	50664	106739	13.0%		
May'12		122001	657900	16367	0	**796268**	428809	101944	31756	83856	29297	63050	3754	16243	**758709**	37559	4.7			758709	661928	41535	55246	7.3%			0	50543	4703	0.6%		
Jun'12		138549	699400	23456	0	**861405**	509621	105075	30439	60330	32145	56300	3142	23278	**819330**	42075	4.9			819330	582686	41535	195109	23.8%			0	50665	144444	17.6%		
Jul'12		143567	670100	20164	0	**833831**	450358	100374	29550	87370	32346	61040	2995	19833	**783866**	49965	6.0			783866	566743	40095	177028	22.6%			0	49946	127082	16.2%		
Aug'12		168886	635600	17978	0	**822464**	442681	99742	29743	87264

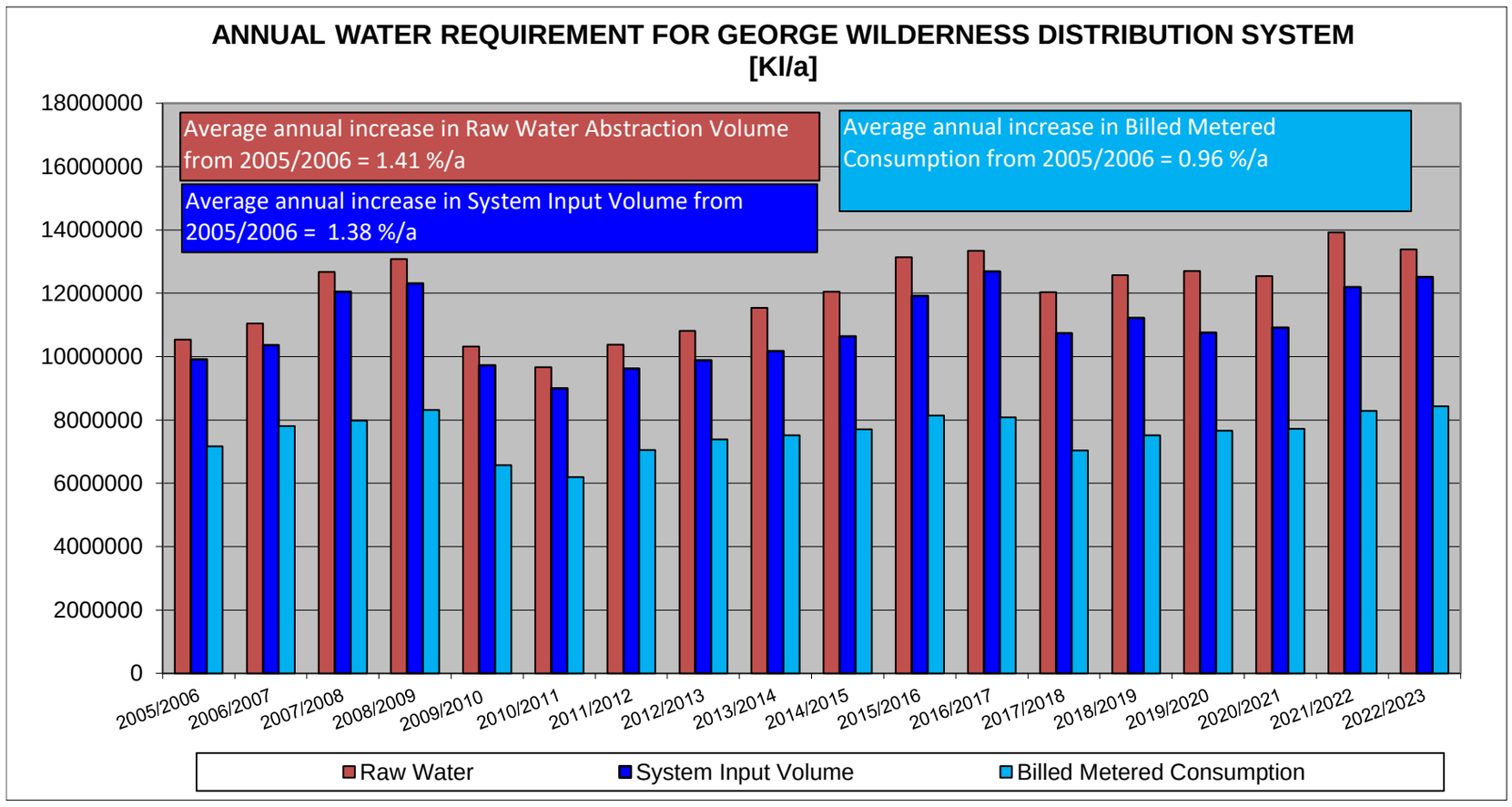
GEORGE MUNICIPALITY
George and Wilderness distribution systems

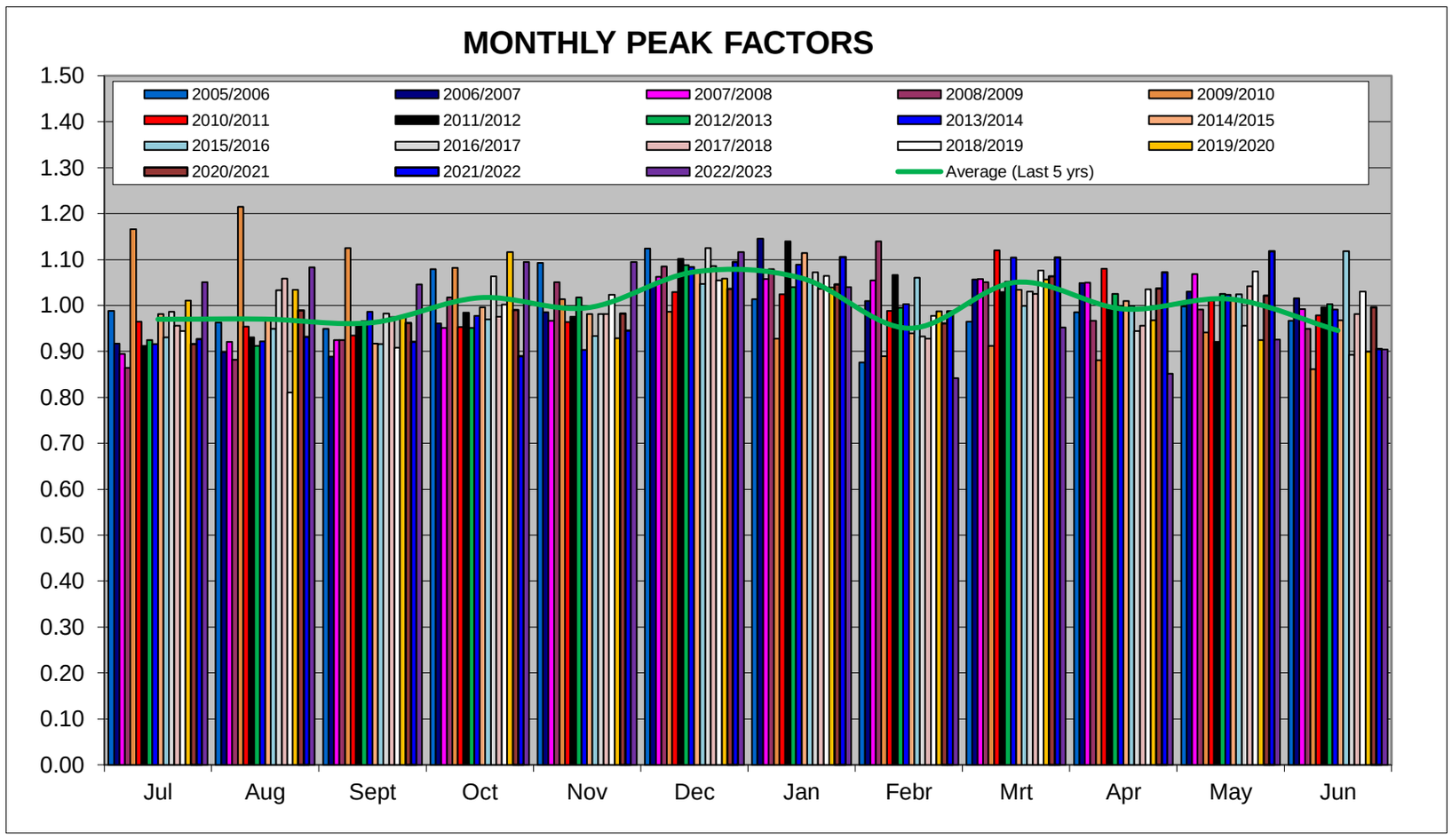
Month	Year	BULK WATER SUPPLY																	TREATED WATER SUPPLY											
		Raw Water Supply					System Input Volume								Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)								
		R1 - Old WTP	R2 - New WTP	R3 - Touw River	Boreholes	Total	B1 - Industrial	B2 - Central	B3 - Glen Barrie (Blanco 2)	B4 - Blanco 1	B5 - Palotti	B6 - Caledon	B7 - S/Veld	B8 - W/Ness	Total	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Unmetered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
Jul'14	14/15	291296	663500	30834	0	**985630**	0	0	0	0	7965	25110	4817	28737	**854995**	130635	13.3	1403163	11.6%	854995	582250	37215	235030	27.5%	2489150	23.4%	0	46692	188838	22.1%	1928073	18.1%
Aug'14		303543	640000	31808	0	**975351**	0	0	0	0	19703	23410	6158	29581	**853577**	121774	12.5			853577	592746	37215	223616	26.2%			0	46689	176927	20.7%		
Sep'14		302942	581947	36197	0	**921086**	479319	0	0	195024	26890	19143	2689	30698	**853819**	70267	7.6			850819	649999	37215	163605	19.2%			0	46684	116921	13.7%		
Oct'14		285589	677282	32170	5546	**1000587**	527574	0	0	213492	8936	27190	7839	30206	**890189**	110398	11.0			890189	645632	37215	207342	23.3%			0	46762	160580	18.0%		
Nov'14		275720	642690	30986	35820	**985216**	480947	0	0	220052	0	25960	14092	28959	**859936**	125280	12.7			859936	592219	37215	230502	26.8%			0	46702	183800	21.4%		
Dec'14		330123	665940	40225	41111	**1077399**	549168	0	0	0	0	21390	12864	37594	**950915**	126484	11.7			950915	659274	37215	254426	26.8%			0	46884	207542	21.8%		
Jan'15		377999	687650	42828	9947	**1118424**	614196	0	0	0	0	20640	9104	32763	**983247**	135177	12.1			983247	766976	37215	179056	18.2%			0	46948	132108	13.4%		
Feb'15		287306	622370	33235	0	**942911**	328968	0	0	197636	9962	23210	6922	28712	**832025**	110886	11.8			832025	686075	37215	108735	13.1%			0	46646	62089	7.5%		
Mar'15		344749	661890	31923	0	**1038662**	550464	0	0	206195	17844	29100	7366	30775	**920626**	117936	11.4			920626	640250	37215	243161	26.4%			0	46823	196338	21.3%		
Apr'15		348071	634870	30749	0	**1013690**	530790	0	0	195811	17305	26140	10216	29780	**889296**	124394	12.3			889296	641484	37215	210997	23.7%			0	46761	163836	18.4%		
May'15		337176	649020	32805	0	**1019001**	554623	0	0	207594	19059	27910	8667	31820	**902425**	116576	11.4			902425	638785	37215	226425	25.1%			0	46787	179638	19.9%		
Jun'15		313111	632300	26585	0	**971996**	504042	0	0	185530	16798	27540	5473	26053	**856640**	113356	11.7			856640	615270	37215	206155	24.0%			0	46699	159456	18.6%		
Jul'15	15/16	336287	655610	27075	0	**1018952**	0	0	0	185530	8803	7562	6886	26053	**880350**	120602	11.8	1226708	9.3%	880350	621203	35775	241372	26.9%	3340090	28.0%	0	48809	192463	21.4%	2750922	23.1%
Aug'15		342962	668940	27287	0	**1039189**	0	0	0	198340	8803	7562	6886	26053	**913969**	125220	12.0			913969	767785	35775	110409	12.1%			0	48940	61469	6.7%		
Sep'15		329856	645370	27464	0	**1002690**	0	0	0	217275	27154	3036	8709	0	**881179**	121511	12.1			881179	643237	35775	202167	22.9%			0	48874	153293	17.4%		
Oct'15		371751	663790	25888	0	**1041429**	0	0	0	196669	17474	2609	9355	0	**934378**	127051	12.0			934378	642613	35775	255990	27.4%			0	48981	207009	22.2%		
Nov'15		346218	645320	30494	0	**1022032**	0	0	0	187356	14948	6544	10106	26628	**907889**	114143	11.2			907889	656718	35775	215396	23.7%			0	48928	166468	18.3%		
Dec'15		426313	683930	35700	0	**1145943**	0	0	0	183799	17098	6289	9745	28664	**1110153**	35790	3.1			1110153	634273	35775	440105	39.6%			0	49332	390723	35.2%		
Jan'16		451325	668400	33345	0	**1153070**	0	0	0	209089	20580	4319	6986	33558	**1079142**	73928	6.4			1079142	750895	35775	292472	27.1%			0	49270	243202	22.5%		
Feb'16		476594	653500	31421	0	**1165155**	0	0	0	214318	20068	9301	7802	31344	**1055638**	105877	9.1			1055638	746824	35775	273039	25.9%			0	49223	223816	21.2%		
Mar'16		447174	618400	28409	0	**1093983**	0	0	0	210715	11284	7382	9280	29380	**1016950**	77033	7.0			1016950	687580	35775	293595	28.9%			0	49146	244449	24.0%		
Apr'16		447174	618400	28409	0	**1093983**	0	0	0	222287	17879	9713	8564	29378	**1016950**	77033	7.0			1016950	683911	35775	297264	29.2%			0	49146	248118	24.4%		
May'16		451079	638200	32174	0	**1121453**	0	0	0	207214	20077	9143	7561	26704	**1063289**	58164	5.2			1063289	668482	35775	359032	33.8%			0	49239	309793	29.1%		
Jun'16		586566	608400	29607	0	**1224573**	0	0	0	207746	18171	9331	8223	30244	**1034217**	190356	15.5			1034217	639193	35775	359249	34.7%			0	49180	310069	30.0%		
Jul'16	16/17	461845	604100	30675	0	**1096620**	0	0	0	0	0	0	0	0	**1042458**	54162	4.9	661091	5.0%	1042458	646995	34335	361128	34.6%	4179788	33.0%	0	49695	311433	29.9%	3583104	28.3%
Aug'16		471004	645500	31853	0	**1148357**	0	0	0	0	0	0	0	0	**1097186**	51171	4.5			1097186	667112	34335	395739	36.1%			0	49804	345935	31.5%		
Sep'16		421761	595000	24096	51734	**1092591**	0	0	0	0	0	0	0	0	**1023828**	68763	6.3			1023828	674184	34335	315309	30.8%			0	49658	265651	25.9%		
Oct'16		468720	657900	23931	31475	**1182026**	0	0	0	0	0	0	0	0	**1107982**	74044	6.3			1107982	679081	34335	394566	35.6%			0	49826	344740	31.1%		
Nov'16		459900	542100	27880	21523	**1051403**	0	0	0	0	0	0	0	0	**1033172**	58231	5.3			1033172	681784	34335	317053	30.7%			0	49676	267377	25.9%		
Dec'16		585879	615000	36289	14050	**1251218**	0	0	0	0	0	0	0	0	**1225431**	25787	2.1			1225431	686245	34335	504851	41.2%			0	50061	454790	37.1%		
Jan'17		606056	536000	28663	15141	**1193060**	0	0	0	0	0	0	0	0	**1139247**	53813	4.4			1139247	784077	34335	320835	28.2%			0	49888	270947	23.8%		
Feb'17		538088	463000	21105	15123	**1037314**	0	0	0	0	0	0	0	0	**995051**	42263	4.1			995051	710430	34335	250286	25.2%			0	49600	200686	20.2%		
Mar'17		575703	541600	28590	0	**1145893**	0	0	0	0	0	0	0	0	**1089154**	56739	5.0			1089154	654966	34335	399853	36.7%			0	49788	350065	32.1%		
Apr'17		373313	545600	28158	0	**1059071**	0	0	0	0	0	0	0	0	**987754**	62317	5.9			987754	650257	34335	303162	30.7%			0	49586	253576	25.7%		
May'17		372200	648400	30321	12200	**1063121**	0	0	0	0	0	0	0	0	**988746**	74375	7.0			988746	649990	34335	304421	30.8%			0	49587	254834	25.8%		
Jun'17		345165	657300	31531	13100	**952196**	0	0	0	0	0	0	0	0	**952170**	40426	4.1			952170	605250	34335	312585	32.8%			0	49514	263071	27.6%		
Jul'17	17/18	361043	539800	31481	25800	**958124**	0	0	0	0	0	0	0	0	**937893**	20231	2.1	1292431	10.7%	937893	631633	32895	273365	29.1%	3302744	30.8%	0	49978	223387	23.8%	2704040	25.2%
Aug'17		368875	521700	27140	41747	**1001462**	0	0	0	0	0	0	0	0	**905142**	156220	14.7			905142	607075	32895	265172	29.3%			0	49912	215260	23.8%		
Sep'17		374631	536800	26068	39555	**977054**	0	0	0	0	0	0	0	0	**873192**	103862	10.6			873192	580660	32895	259637	29.7%			0	49848	209789	24.0%		
Oct'17		381451	530300	29209	37384	**978344**	0	0	0	0	0	0	0	0	**909114**	69230	7.1			909114	571341	32895	304878	33.5%			0	49920	254958	28.0%		
Nov'17		449277	478800	22896	33306	**984279**	0	0	0	0	0	0	0	0	**897144**	87135	8.9			897144	550265	32895	313984	35.0%			0	49696	264087	29.4%		
Dec'17		421492	603300	29136	34647	**1088575**	0	0	0	0	0	0	0	0	**1035425**	53150	4.9			1035425	577952	32895	424578	41.0%			0	50173	374405	36.2%		
Jan'18		463879	529000	24524	20022	**1039325**	0	0	0	0	0	0	0	0	**926841**	112484	10.8			926841	634783	32895	259163	28.0%			0	49956	209208	22.6%		
Feb'18		435919	471600	22910	0	**930429**	0	0	0	0	0	0	0	0	**852098**	78331	8.4			852098	650681	32895	168522	19.8%			0	49806	118715	13.9%		
Mar'18		469994	505600	28593	-91	**1026187**	0	0	0	0	0	0	0	0	**877148**	151039	14.7			877148	580158	32895	264095	30.1%			0	49656	214239	24.4%		
Apr'18		462794	470800	24729	0	**958323**	0	0	0	0	0	0	0	0	**782916**	175407	18.3			782916	555020	32895	195001	24.9%			0	49668	145333	18.6%		
May'18		494583	518000	32080	0	**1044663**	0	0	0	0	0	0	0	0	**904339**	140324	13.4			904339	542781	32895	328663	36.3%			0	49911	278752	30.8%		
Jun'18		382815	572500	29419	0	**983734**	0	0	0	0	0	0	0	0	**838816**	144918	14.7			838816	560234	32895	245687	29.3%			0	49780	195907	23.4%		
Jul'18	18/19	492810	468000	28223	0	**989033**	0	0	0	0	0	0	0	0	**845716**	143317	14.5	1345142	10.7%	845716	589386	32895	223435	26.4%	3312114	29.5%	0	50525	172910	20.4%	2703652	24.1%
Aug'18		476507	343134	29780	0	**849421**	0	0	0	0	0	0	0	0	**820273**	29148	3.4			820273	602426	32895	184952	22.5%			0	50475	134477	16.4%		
Sep'18		436453	485100	29493	0	**951046**	0	0	0	0	0	0	0	0	**906266**	44780	4.7			906266	588887	32895	284484	31.4%			0	50647	233837	25.8%		
Oct'18		406900	612200	30462	0	**1049562**	0	0	0	0	0	0	0	0	**954644**	94918	9.0			954644	594704	32895	327045	34.3%			0	50743	276302	28.9%		
Nov'18		409932	616900	30661	0	**1072193**	0	0	0	0	0	0	0	0	**987141**	85052	7.9			987141	628771	32895	325475	33.0%			0	50808	274667	27.8%		
Dec'18		428453	639200	37773	0	**1105426**	0	0	0	0	0	0	0	0	**1007229**	102697	9.3			1007229	598846	32895	370988	37.0%			0	50839	320149	31.9%		
Jan'19		421915	653800	39105	0	**1114820**	0	0	0	0	0	0	0	0	**988111**	128709	11.5			988111	674576	32895	278640	28.3%			0	50806	227834	23.1%		
Feb'19		413403	582500	28671	0	**1024574**	0	0	0	0	0	0	0	0	**894515**	130059	12.7			894515	670589	32895	191031	21.4%			0	50623	140408	15.7%		
Mar'19		452532	643500	31437	0	**1127469**	0	0	0	0	0	0	0	0	**973010**	154459	13.7			973010	647581	32895	292534	30.1%			0	50780	241754	24.8%		
Apr'19		476542	578500	29125	0	**1084167**	0	0	0	0	0	0	0	0	**935926**	148241	13.7			935926	632205	32895	270826	28.9%			0	50706	220120	23.5%		
May'19		474150	620800	30258	0	**1125208**	0	0	0	0	0	0	0	0	**966512**	158696	14.1			966512	694199	32895	239418	24.8%			0	50767	188651	19.5%		
Jun'19		459702	591200	28420	0	**1073222**	0	0	0	0	0	0	0	0	**954256**	125066	11.6			954256	598075	32895	323286	33.9%			0	50743	272543	28.6%		
Jul'19	19/20	490876	550300	28663	0	**1069839**	0	0	0	0	0	0	0	0	**923932**	145907	13.6	1345142	10.7%	923932	606185	31560	286187	31.0%	2719340	25.3%	0	80436	205751	22.3%	1754772	16.3%
Aug'19		480622	581400	31930	0	**1093952**	0	0	0	0	0	0	0	0	**944198**	149754	13.7			944198	611952	31560	300686	31.8%			0	80476	220210	23.3%		
Sep'19		454584	548800	31069	0	**1034453**	0	0	0	0	0	0	0	0	**900453**	134000	13.0			900453	644395	31560	224498	24.9%			0	80389	144109	16.0%		
Oct'19		566235	550000	30109	0	**1181344**	0	0	0	0	0	0	0	0	**944373**	236971	20.1			944373	645521	31560	267292	28.3%			0	80477	186815	19.8%		
Nov'19		369250	589000	24953	0	**983203**	0	0	0	0	0	0	0	0	**909580**	73623	7.5			909580	645685	31560	237335	26.1%			0	80407	156928	17.3%		
Dec'19		449440	636400	33877	0	**1119717**	0	0	0	0	0	0	0	0	**943689**	176028	15.7	1943200	15.3%	943689	632258	31560	279871	29.7%			0	80475	199396	21.1%		
Jan'20		453149	619500	26653	0	**1099302**	0	0	0	0	0	0	0	0	**915862**	183440	16.7			915862	725358	31560	158944	17.4%			0	80420	78525	8.6%		
Feb'20		415600	601800	27237	0	**1044637**	0	0	0	0	0	0	0	0	**857910**	186727	17.9			857910	681517	31560	144833	16.9%			0	80304	64529	7.5%		
Mar'20		446190	646600	25164	0	**1117954**	0	0	0	0	0	0	0	0	**916437**	201517	18.0			916437	629078	31560	255799	27.9%			0	80421	175378	19.1%		
Apr'20		436752	558400	28527	0	**1023679**	0	0	0	0	0	0	0	0	**838027**	185652	18.1			838027	602710	31560	203755	24.3%			0	80264	123493	14.7%		
May'20		372559	579400	27190	0	**979059**	0	0	0	0	0	0	0	0	**831140**	147919	15.1			831140	604870	31560	194710	23.4%			0	80250	114460	13.8%		
Jun'20		323824	604900	23472	0	**952196**	0	0	0	0	0	0	0	0	**830534**	121662	12.8			830534	633547	31560	165427	19.9%			0	80249	85178	10.3%		
Jul'20	20/21	323824	604900	29369	0	**958093**	0	0	0	0	0	0	0	0	**897265**	60828	6.3	1622664	12.9%	897265	650873	31185	215207	24.0%	2829189	25.9%	0	50525	172910	20.4%	1371842	12.6%
Aug'20		439661	567100	27772	0	**1034333**	0	0	0	0	0	0	0	0	**859516**	174817	16.9			859516	608514	31185	219817	25.6%			0	50475	124344	16.4%		
Sep'20		426513	561500	17222	0	**1005235**	0	0	0	0	0	0	0	0	**818510**	186725	18.6			818510	613241	31185	174084	21.3%			0	50467	123738	15.3%		
Oct'20		426618	561600	27306	0	**1035524**	0	0	0	0	0	0	0	0	**859794**	175730	17.0			859794	615233	31185	213376	24.4%			0	50467	124344	16.4%		
Nov'20		436051	561600	29522	0	**1027173**	0	0	0	0	0	0	0	0	**887177**	139996	13.6			887177	635626	31185	220366	24.8%			0	50467	124344	16.4%		
Dec'20		436492	561600	34933	0	**1053304**	0	0	0	0	0	0	0	0	**886918**	140918	13.6			886918	636436	31185	219297	24.7%			0	50467	124344	16.4%		
Jan'21		446309	617000	29866	0	**1093175**	0	0	0	0	0	0	0	0	**955368**	137807	12.6			955368	667787	31185	256396	26.8%			0	50467	121536	13.4%		
Feb'21		405216	568000	31252	0	**1004468**	0	0	0	0	0	0	0	0	**893815**	110653	11.0			893815	706814	31185	155816	17.4%			0	50467	121413	14.0%		
Mar'21		440400	639800	31303	0	**1111503**	0	0	0	0	0	0	0	0	**1006182**	105321	9.5			1006182	699535	31185	275462	27.4%			0	50467	121637	15.3%		
Apr'21		454347	597800	31633	0	**1083780**	0	0	0	0	0	0	0	0	**942453**	141327	13.0			942453	663497	31185	247771	26.3%			0	50467	121510	13.4%		
May'21		431870	608900	27311	0	**1068081**	0	0	0	0	0	0	0	0	**939552**	128529	12.0			939552	643433	31185	264934	28.2%			0	50467	121504	14.3%		
Jun'21		409634	606700	25099	0	**1041424**	0	0	0	0	0	0	0	0	**927411**	114013	10.9			927411	623148	31185	273078	29.4%			0	50467	121480	15.1%		
Jul'21	21/22	589500	449984	35065	0	**1074559**	0	0	0	0	0	0	0	0	**961149**	113410	10.6	1723930	12.4%	961149	632473	30675	298001	31.0%	3539882	29.0%	0	133406	164595	17.1%	1937685	15.9%
Aug'21		610300	453468	16817	0	**1080585**	0	0	0	0	0	0	0	0	**973827**	106758	9.9			973827	647242	30675	295910	30.4%			0	133432	162478	16.7%		
Sep'21		604300	433524	30085	0	**1067909**	0	0	0	0	0	0	0	0	**966685**	101224	9.5			966685	646983	30675	288027	29.9%			0	133417	155610	16.1%		
Oct'21		638000	364151	29405	0	**1031556**	0	0	0	0	0	0	0	0	**934232**	97324	9.4			934232	665141	30675	238416	25.5%			0	133352	105064	11.2%		
Nov'21		574500	493564	27784	0	**1095848**	0	0	0	0	0	0	0	0	**939631**	65217	6.0			939631	676324	30675	323032	31.4%			0	133545	190087	18.4%		
Dec'21		672800	562469	34832	0	**1270101**	0	0	0	0	0	0	0	0	**1091371**	178730	14.1			1091371	644631	30675	416065	38.1%			0	133667	282398	25.9%		
Jan'22		666000	580259	35548	0	**1281705**	0	0	0	0	0	0	0	0	**1124157**	157548	12.3			1124157	713971	30675	379511	33.4%			0	133732	241879	21.5%		
Feb'22		643500	469331	31823	0	**1144654**	0	0	0	0	0	0	0	0	**986814**	157840	13.8			986814	744756	30675	211383	21.4%			0	133458	77926	7.9%		
Mar'22		719200	530419	31909	0	**1281528**	0	0	0	0	0	0	0	0	**1072235**	209763	16.3			1072235	710219	30675	331341	30.9%			0	133628	197713	18.4%		
Apr'22		675300	535186	32963	0	**1243449**	0	0	0	0	0	0	0	0	**1056721**	186735	15.0			1056721	764574	30675	261472	24.7%			0	133897	127875	12.1%		
May'22		742000	542880	12114	0	**1296994**	0	0	0	0	0	0	0	0	**1038010**	258894	20.0			1038010	741178	30675	266157	25.6%			0	133560	132597	12.8%		
Jun'22		481700	539033	28873	0	**1049606**	0	0	0	0	0	0	0	0	**958732**	90874	8.7			958732	695190	30675	232867	24.3%			0	133401	95466	10.4%		
Jul'22	22/23	532672	611900	27044	0	**1171616**	0	0	0	0	0	0	0	0	**971674**	199942	17.1	864423	6.5%	971674	708182	31770	231722	23.8%	3703779	29.6%	0	123323	108399	11.2%	2222186	17.8%
Aug'22		547924	626500	32649	0	**1207073**	0	0	0	0	0	0	0	0	**979411**	227662	18.9			979411	669564	31770	278077	28.4%			0	123339	154738	15.8%		
Sep'22		505229	634300	26371	0	**1165900**	0	0	0	0	0	0	0	0	**1005838**	160062	13.7			1005838	700244	31770	273824	27.2%			0	123392	150432	15.0%		
Oct'22		530816	657600	31762	0	**1220178**	0	0	0	0	0	0	0	0	**1060951**	159227	13.0			1060951	687961	31770	341220	32.2%			0	123502	217718	20.5%		
Nov'22		540261	654500	25910	0	**1220671**	0	0	0	0	0	0	0	0	**1044661**	176010	14.4			1044661	707342	31770	305549	29.2%			0	123469	182080	17.4%		
Dec'22		548549	675100	22516	0	**1244165**	0	0	0	0	0	0	0	0	**1158892**	85273	6.9			1158892	693966	31770	433156	37.4%			0	123698	309458	26.7%		
Jan'23		516054	620900	23035	0	**1159989**	0	0	0	0	0	0	0	0	**1142044**	17945	1.5			1142044	785372	31770	324902	28.4%			0	123664	201238	17.6%		
Feb'23		419807	501300	18003	0	**939179**	0	0	0	0	0	0	0	0	**974709**	-35539	-3.8			974709	725831	31770	217108	22.3%			0	123329	93779	9.6%		
Mar'23		506457	533000	22498	0	**1061955**	0	0	0	0	0	0	0	0	**1117313**	-55358	-5.2			1117313	704353	31770	381190	34.1%			0	123615	257575	23.1%		
Apr'23		401061	529600	19272	0	**949933**	0	0	0	0	0	0	0	0	**1018542**	-68609	-7.2			1018542	707756	31770	279016	27.4%			0	123417	155599	15.3%		
May'23		357458	657500	17240	0	**1032198**	0	0	0	0	0	0	0	0	**1048986**	-16788	-1.6			1048986	686437	31770	330779	31.5%			0	123478	207301	19.8%		
Jun'23		414172	570400	23343	0	**1007915**	0	0	0	0	0	0	0	0	**993319**	14596	1.4			993319	654313	31770	307236	30.9%			0	123367	183869	18.5%		

Month	Year	BULK WATER SUPPLY																	TREATED WATER SUPPLY											
		Raw Water Supply					System Input Volume								Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)								
		R1 - Old WTP	R2 - New WTP	R3 - Touw River	Boreholes	Total	B1 - Industrial	B2 - Central	B

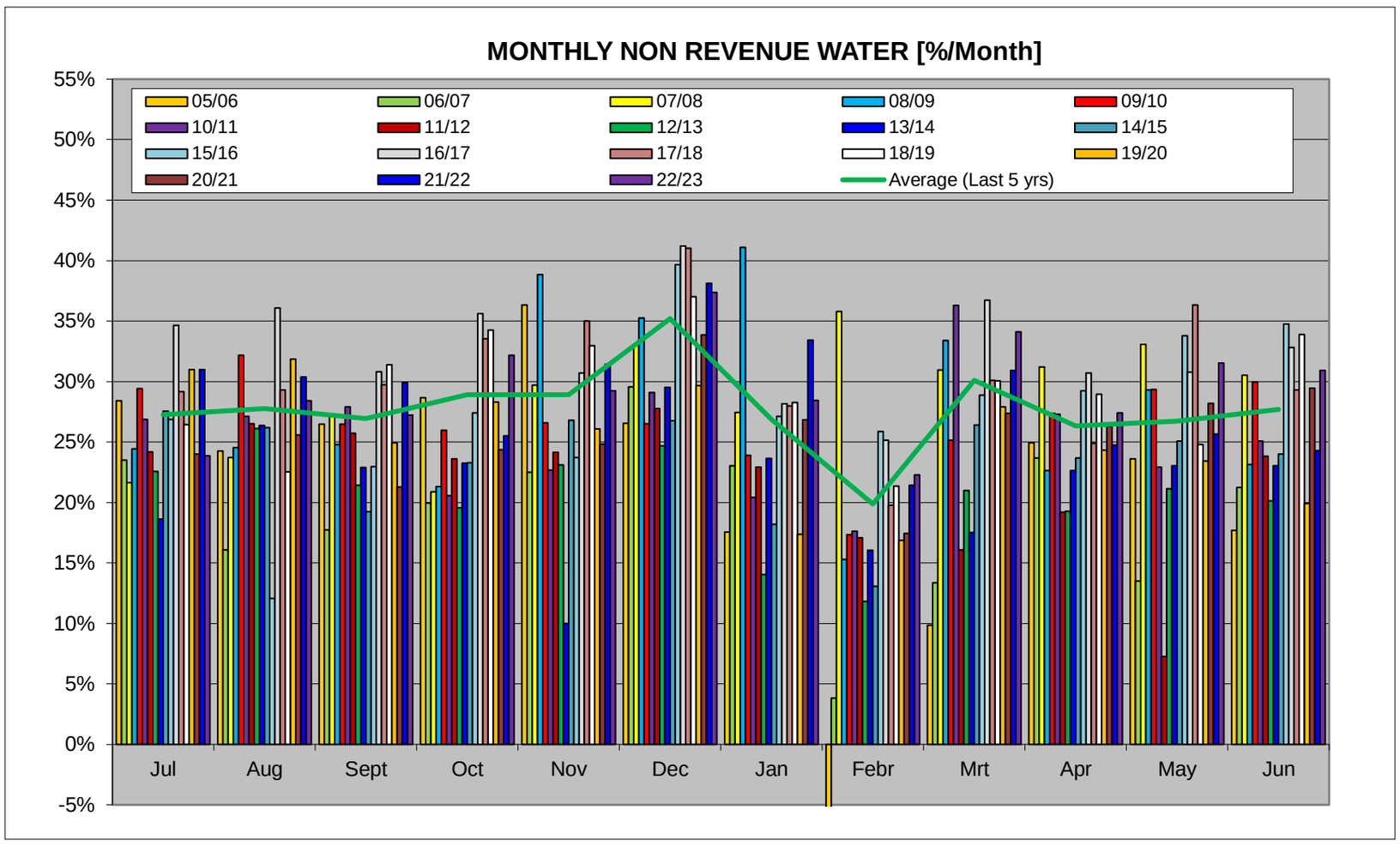
WATER BALANCE AND LOSSES FOR GEORGE AND WILDERNESS

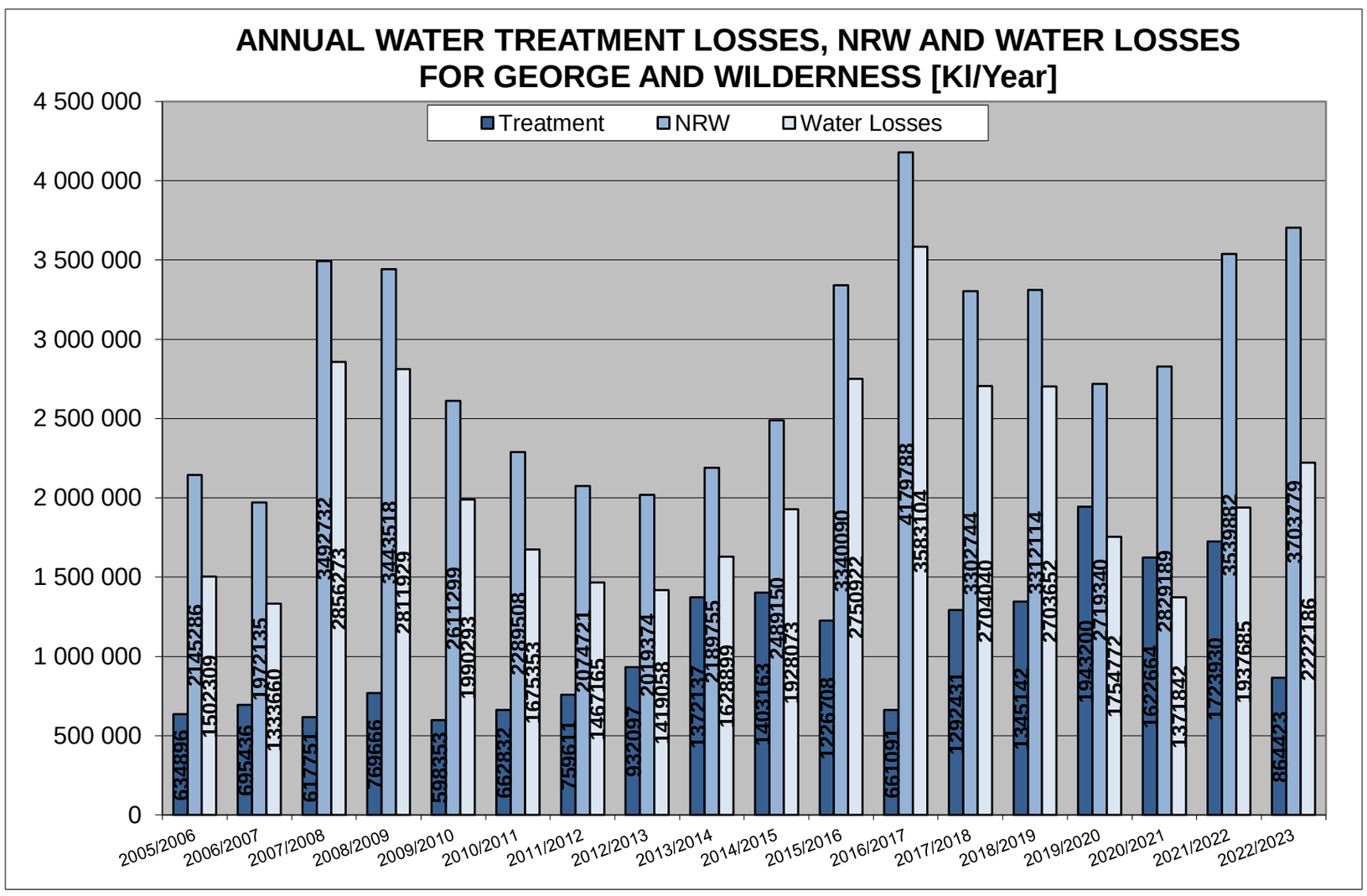






WATER BALANCE AND LOSSES FOR GEORGE AND WILDERNESS





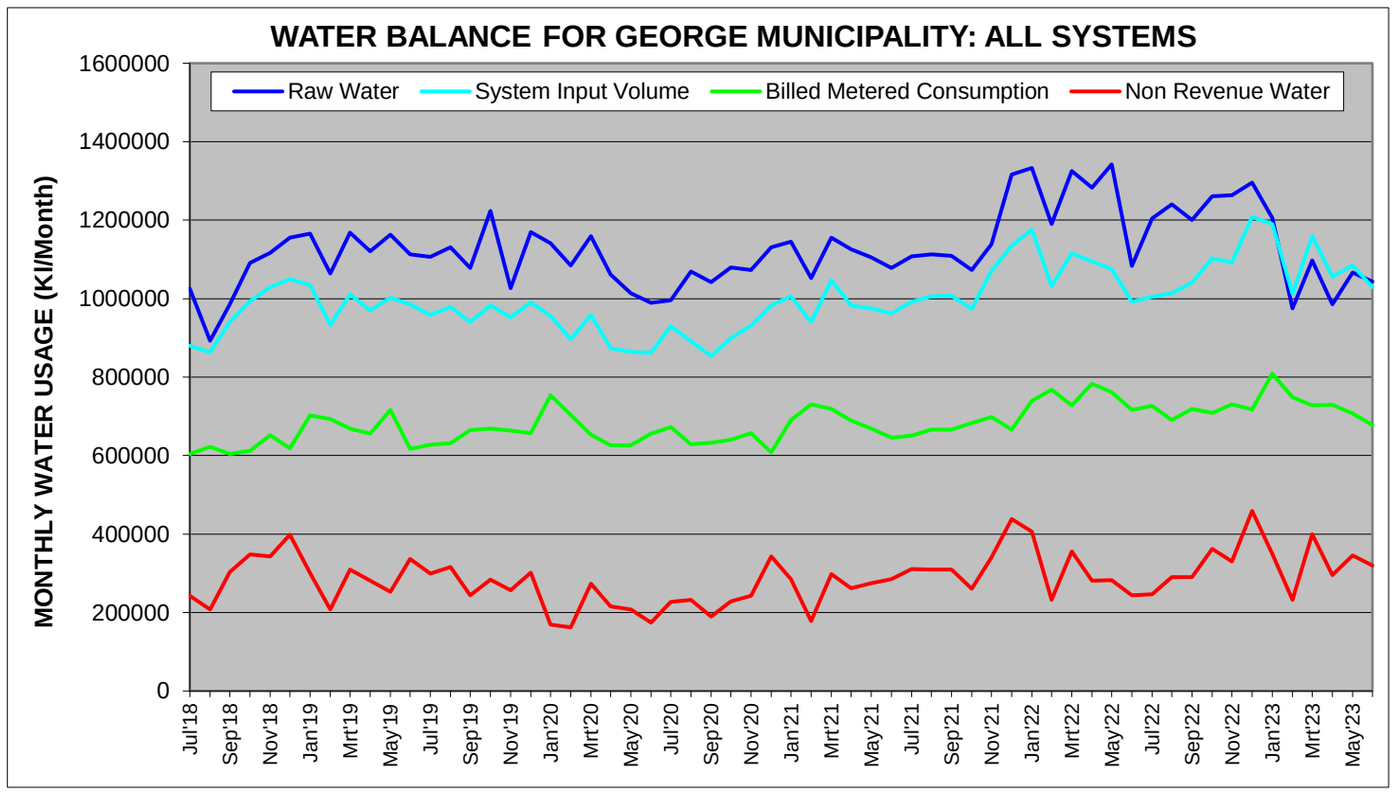
GEORGE MUNICIPALITY - ALL SYSTEMS																					
Month	Year			Treatment Losses				System Input Volume	Revenue Water		TREATED WATER SUPPLY Non Revenue Water (NRW)										
		Raw Water Supply	System Input Volume	Monthly Treatment Losses	Monthly Treatment Losses	Annual Treatment Losses	Annual Treatment Losses	Treated Water from WTW	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
Jul'18	2018/2019	1025245	880131	145114	14.2	1367741	10.5%	880131	604147	32895	243089	27.6	3529903	30.2%	0	51590	191499	21.8%	2908558	24.9%
Aug'18		892683	862677	30006	3.4			862677	622282	32895	207500	24.1			0	51555	155944	18.1%		
Sep'18		985790	940077	45713	4.6			940077	604607	32895	302575	32.2			0	51710	250865	26.7%		
Oct'18		1090475	993642	96833	8.9			993642	612187	32895	348560	35.1			0	51817	296743	29.9%		
Nov'18		1116583	1028642	87941	7.9			1028642	652534	32895	343213	33.4			0	51887	291326	28.3%		
Dec'18		1154873	1049853	105020	9.1			1049853	619079	32895	397879	37.9			0	51930	345949	33.0%		
Jan'19		1165880	1035007	130873	11.2			1035007	702056	32895	300056	29.0			0	51900	248156	24.0%		
Feb'19		1064104	933106	130998	12.3			933106	692976	32895	207235	22.2			0	51696	155539	16.7%		
Mrt'19		1168028	1011671	156357	13.4			1011671	669018	32895	309758	30.6			0	51853	257905	25.5%		
Apr'19		1120756	970037	150719	13.4			970037	655788	32895	281354	29.0			0	51770	229584	23.7%		
May'19		1162537	1001568	160969	13.8			1001568	715940	32895	252733	25.2			0	51833	200900	20.1%		
Jun'19		1113135	985937	127198	11.4			985937	617091	32895	335951	34.1			0	51802	284149	28.8%		
Jul'19	2019/2020	1107015	958185	148830	13.4	1971038	15.0%	958185	627674	31560	298951	31.2	2902251	25.9%	0	81350	217601	22.7%	1926617	17.2%
Aug'19		1130639	979050	151589	13.4			979050	631631	31560	315859	32.3			0	81392	234467	23.9%		
Sep'19		1077662	940059	137603	12.8			940059	665185	31560	243314	25.9			0	81314	162000	17.2%		
Oct'19		1223343	983358	239985	19.6			983358	668453	31560	283345	28.8			0	81401	201944	20.5%		
Nov'19		1027223	951587	75636	7.4			951587	663718	31560	256309	26.9			0	81337	174972	18.4%		
Dec'19		1168975	990484	178491	15.3			990484	656532	31560	302392	30.5			0	81415	220977	22.3%		
Jan'20		1141105	955575	185530	16.3			955575	754295	31560	169720	17.8			0	81345	88375	9.2%		
Feb'20		1084475	896765	187710	17.3			896765	703004	31560	162201	18.1			0	81228	80974	9.0%		
Mrt'20		1159619	958079	201540	17.4			958079	653099	31560	273420	28.5			0	81350	192070	20.0%		
Apr'20		1060941	873484	187457	17.7			873484	626835	31560	215089	24.6			0	81181	133908	15.3%		
May'20		1013516	864823	148693	14.7			864823	625756	31560	207507	24.0			0	81164	126343	14.6%		
Jun'20		989599	861625	127974	12.9			861625	655922	31560	174143	20.2			0	81157	92986	10.8%		
Jul'20	2020/2021	995496	930451	65045	6.5	1649130	12.6%	930451	672310	31215	226926	24.4	3043790	26.7%	0	123337	103589	11.1%	1563273	13.7%
Aug'20		1068633	892023	176610	16.5			892023	629189	31215	231619	26.0			0	123260	108359	12.1%		
Sep'20		1042535	853718	188817	18.1			853718	632668	31215	189835	22.2			0	123183	66652	7.8%		
Oct'20		1078989	899221	179768	16.7			899221	639795	31215	228211	25.4			0	123274	104937	11.7%		
Nov'20		1072904	930990	141914	13.2			930990	657724	31215	242051	26.0			0	123338	118713	12.8%		
Dec'20		1131261	982380	148881	13.2			982380	607703	31215	343462	35.0			0	123441	220021	22.4%		
Jan'21		1144604	1006208	138396	12.1			1006208	690428	31215	284565	28.3			0	123488	161076	16.0%		
Feb'21		1052999	940605	112394	10.7			940605	730842	31215	178548	19.0			0	123357	55191	5.9%		
Mrt'21		1155500	1047752	107748	9.3			1047752	719134	31215	297403	28.4			0	123572	173831	16.6%		
Apr'21		1125428	982327	143101	12.7			982327	689487	31215	261625	26.6			0	123441	138185	14.1%		
May'21		1105035	974931	130104	11.8			974931	668753	31215	274963	28.2			0	123426	151537	15.5%		
Jun'21		1078225	961873	116352	10.8			961873	646076	31215	284582	29.6			0	123400	161182	16.8%		
Jul'21	2021/2022	1108365	991945	116420	10.5	1746380	12.1%	991945	650850	30720	310375	31.3	3771983	29.8%	0	135439	174936	17.6%	2145186	16.9%
Aug'21		1113406	1006005	107401	9.6			1006005	665932	30720	309353	30.8			0	135467	173886	17.3%		
Sep'21		1109146	1006775	102371	9.2			1006775	666647	30720	309408	30.7			0	135469	173939	17.3%		
Oct'21		1072620	974324	98296	9.2			974324	682428	30720	261176	26.8			0	135404	125772	12.9%		
Nov'21		1138164	1070181	67983	6.0			1070181	698619	30720	340842	31.8			0	135595	205247	19.2%		
Dec'21		1315791	1135155	180636	13.7			1135155	666463	30720	437972	38.6			0	135725	302247	26.6%		
Jan'22		1333321	1175987	157334	11.8			1175987	739272	30720	405995	34.5			0	135807	270188	23.0%		
Feb'22		1189654	1031266	158388	13.3			1031266	768423	30720	232123	22.5			0	135518	96605	9.4%		
Mrt'22		1325668	1115511	210157	15.9			1115511	728402	30720	356389	31.9			0	135686	220703	19.8%		
Apr'22		1282727	1094943	187784	14.6			1094943	783319	30720	280904	25.7			0	135645	145259	13.3%		
May'22		1342232	1074973	267259	19.9			1074973	761177	30720	283076	26.3			0	135605	147471	13.7%		
Jun'22		1083868	991517	92351	8.5			991517	716427	30720	244370	24.6			0	135438	108932	11.0%		
Jul'22	2022/2023	1204253	1004460	199793	16.6	843911	6.1%	1004460	726378	32040	246042	24.5	3917767	30.1%	0	125309	120733	12.0%	2412177	18.6%
Aug'22		1240254	1013340	226914	18.3			1013340	691118	32040	290182	28.6			0	125327	164855	16.3%		
Sep'22		1200248	1041084	159164	13.3			1041084	719047	32040	289997	27.9			0	125382	164615	15.8%		
Oct'22		1260853	1102926	157927	12.5			1102926	709135	32040	361751	32.8			0	125506	236245	21.4%		
Nov'22		1264166	1092834	171332	13.6			1092834	730858	32040	329936	30.2			0	125486	204450	18.7%		
Dec'22		1296292	1208353	87939	6.8			1208353	717222	32040	459091	38.0			0	125717	333374	27.6%		
Jan'23		1205177	1190324	14853	1.2			1190324	808909	32040	349375	29.4			0	125681	223694	18.8%		
Feb'23		975762	1013017	-37255	-3.8			1013017	748928	32040	232049	22.9			0	125326	106723	10.5%		
Mrt'23		1097583	1159205	-61622	-5.6			1159205	727819	32040	399346	34.4			0	125618	273728	23.6%		
Apr'23		984998	1056084	-71086	-7.2			1056084	729146	32040	294898	27.9			0	125412	169486	16.0%		
May'23		1066342	1084696	-18354	-1.7			1084696	707136	32040	345520	31.9			0	125469	220051	20.3%		
Jun'23		1043160	1028854	14306	1.4			1028854	677234	32040	319580	31.1			0	125358	194222	18.9%		

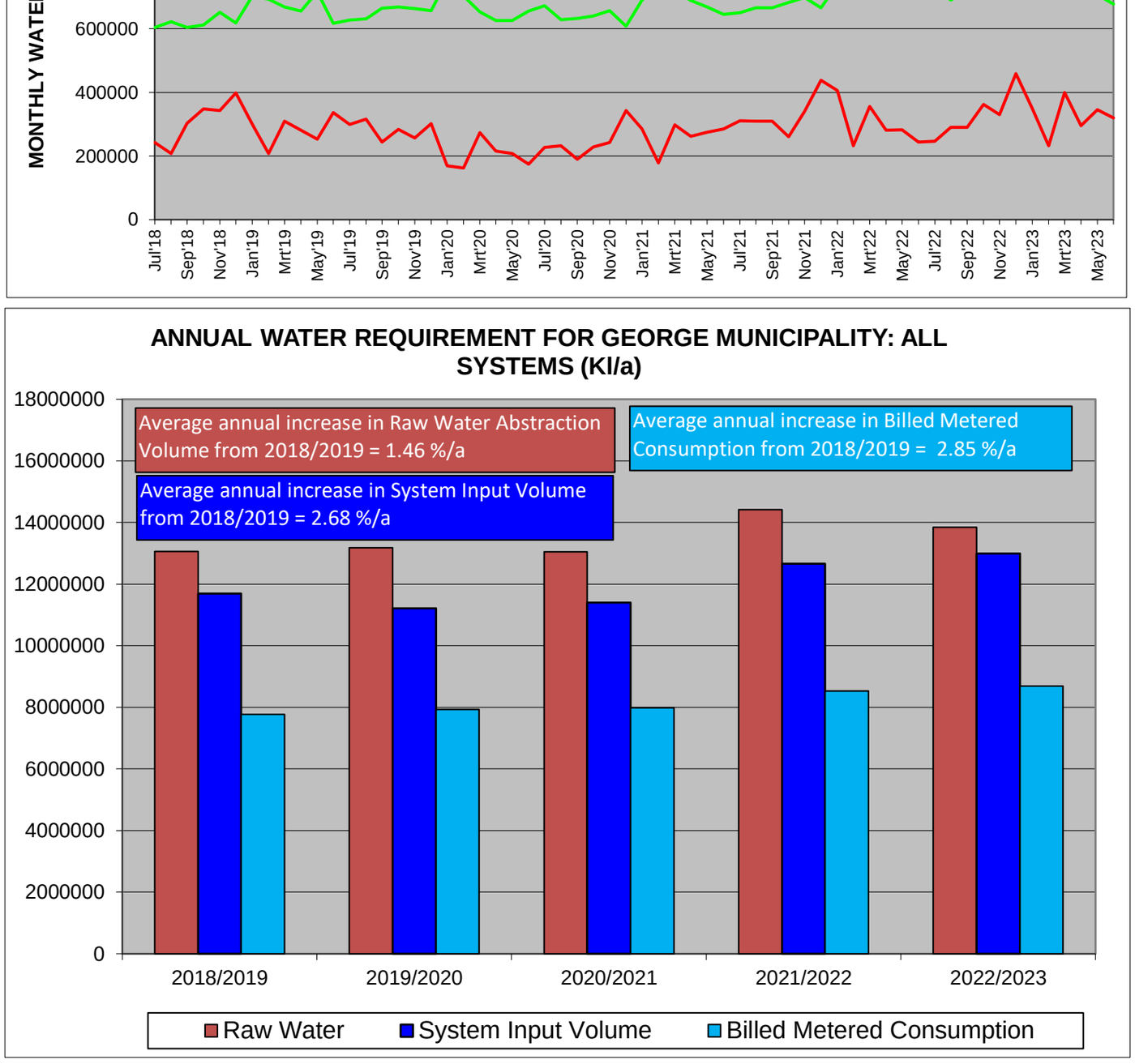
ANNUAL TOTALS																					
Year	Raw Water Supply	System Input Volume	Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)											
			Monthly Treatment Losses	Monthly Treatment Losses	Annual Treatment Losses	Annual Treatment Losses	Treated Water from WTW	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses		
	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]		
2018/2019	13060089	11692348			1367741	10.47%	11692348	7767705	394740			3529903	30.19%	0	621345			2908558	24.88%		
2019/2020	13184112	11213074			1971038	14.95%	11213074	7932103	378720			2902251	25.88%	0	975634			1926617	17.18%		
2020/2021	13051609	11402479			1649130	12.64%	11402479	7984109	374580			3043790	26.69%	0	1480517			1563273	13.71%		
2021/2022	14414962	12668582			1746380	12.12%	12668582	8527959	368640			3771983	29.77%	0	1626797			2145186	16.93%		
2022/2023	13839088	12995177			843911	6.10%	12995177	8692930	384480			3917767	30.15%	0	1505590			2412177	18.56%		

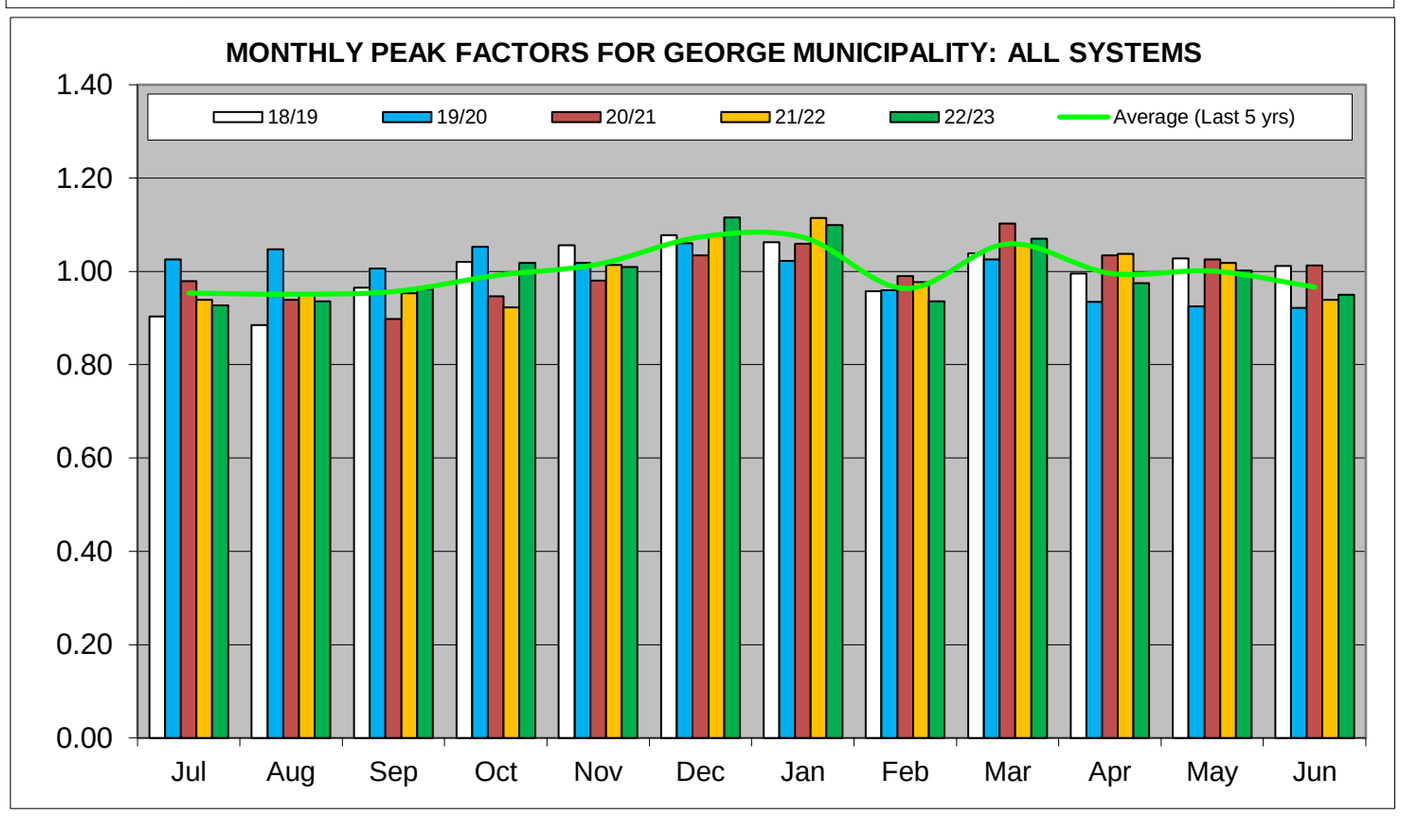
Water Balance Components					
Component	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Consumer Units	37244	37825	38197	38895	39910
System Input Volume	860	812	818	892	892
Average Billed Metered Cons.	571	575	573	601	597
Non-Revenue Water	260	210	218	266	269

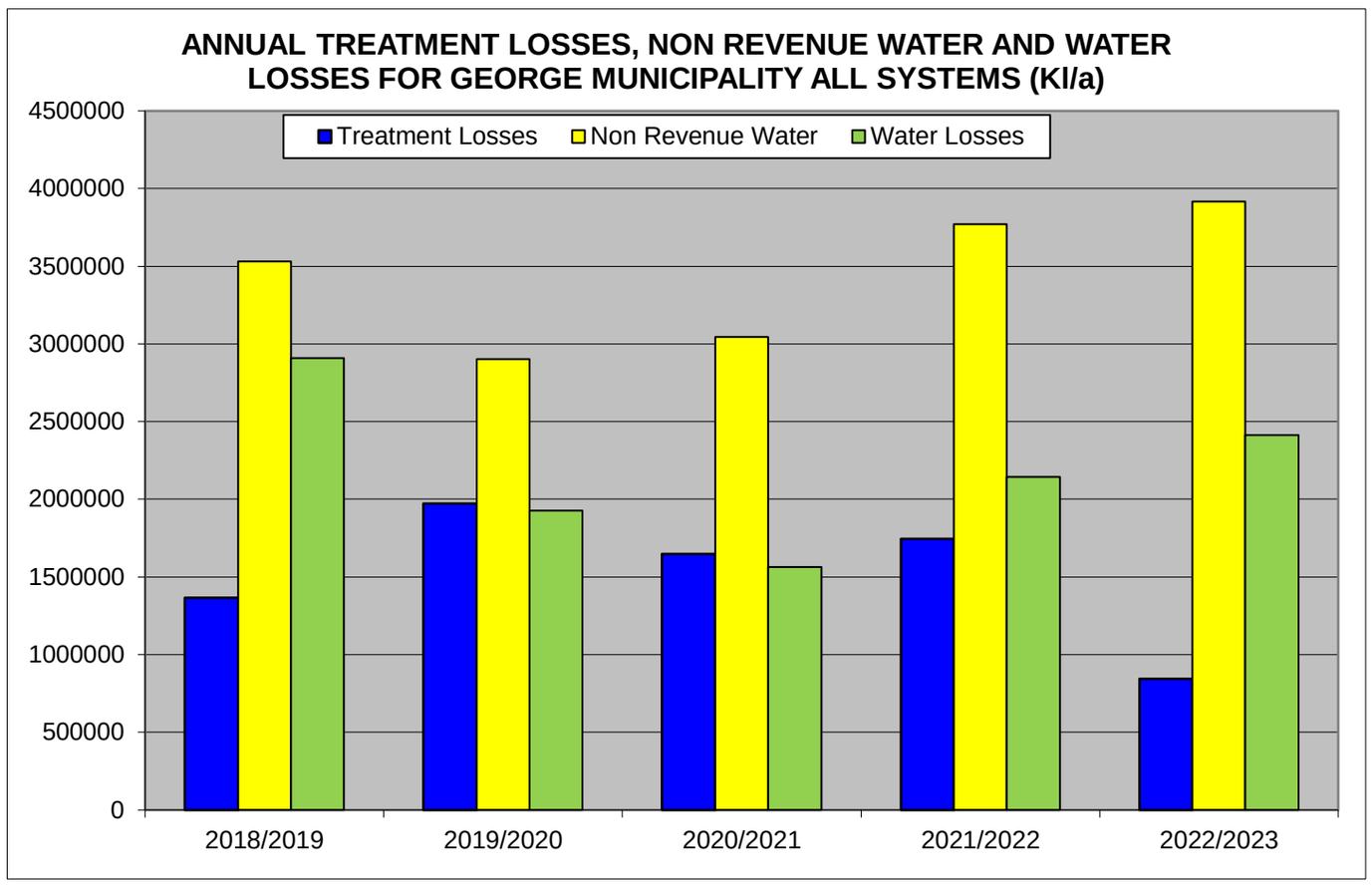
Water Balance Components					
Component	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume		-5.57%	0.70%	9.11%	-0.03%
Average Billed Metered Cons.		0.55%	-0.32%	4.89%	-0.66%
Non-Revenue Water		-19.04%	3.86%	21.70%	1.22%

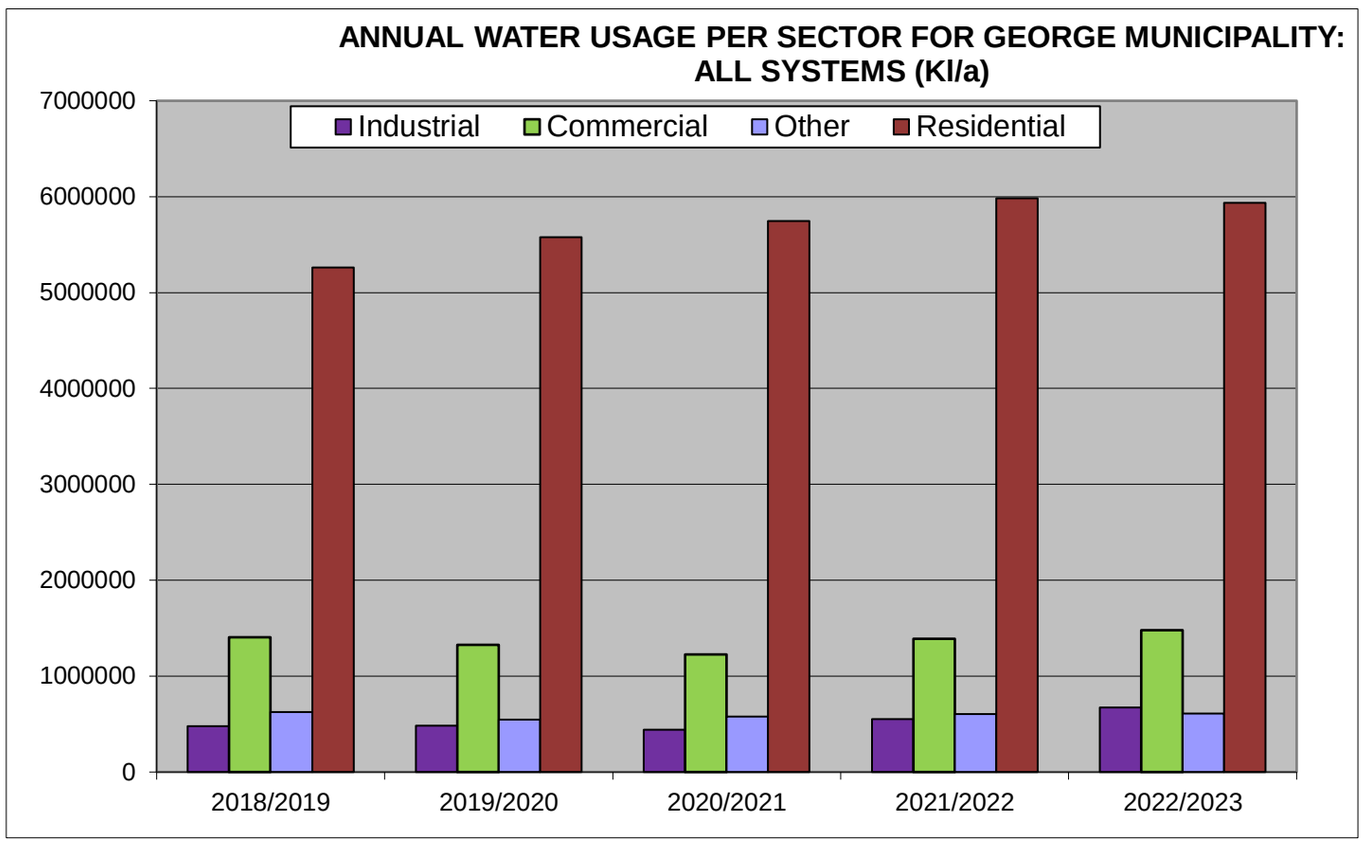
Water Balance Components					
Component	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume		Fall	Rise	Rise	Fall
Average Billed Metered Cons.		Rise	Fall	Rise	Fall
Non-Revenue Water		Fall	Rise	Rise	Rise

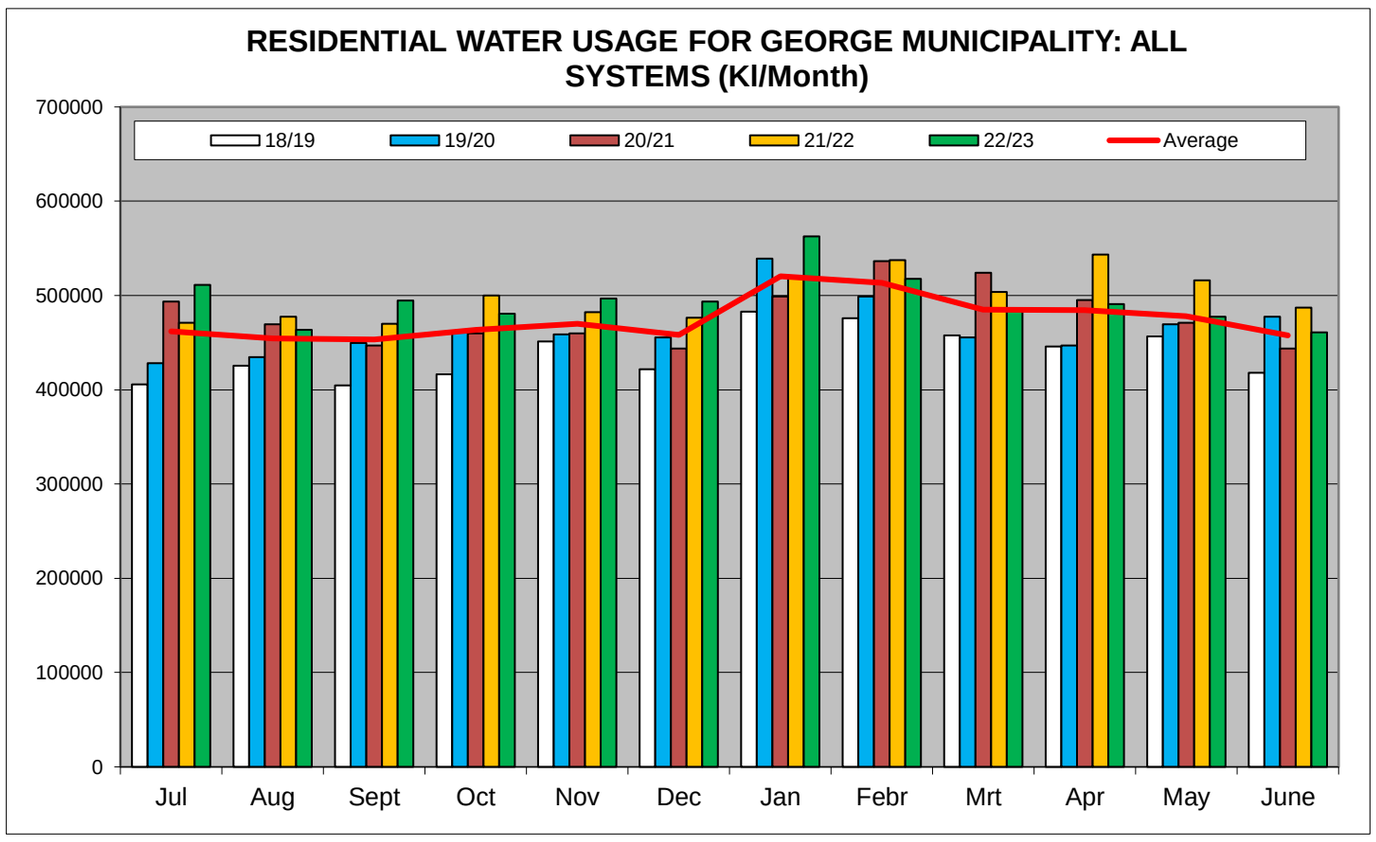

WATER BALANCE FOR GEORGE MUNICIPALITY: ALL SYSTEMS
MONTHLY WATER USAGE (Kl/Month)
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Raw Water
System Input Volume
Billed Metered Consumption
Non Revenue Water
Jul'18
Sep'18
Nov'18
Jan'19
Mrt'19
May'19
Jul'19
Sep'19
Nov'19
Jan'20
Mrt'20
May'20
Jul'20
Sep'20
Nov'20
Jan'21
Mrt'21
May'21
Jul'21
Sep'21
Nov'21
Jan'22
Mrt'22
May'22
Jul'22
Sep'22
Nov'22
Jan'23
Mrt'23
May'23

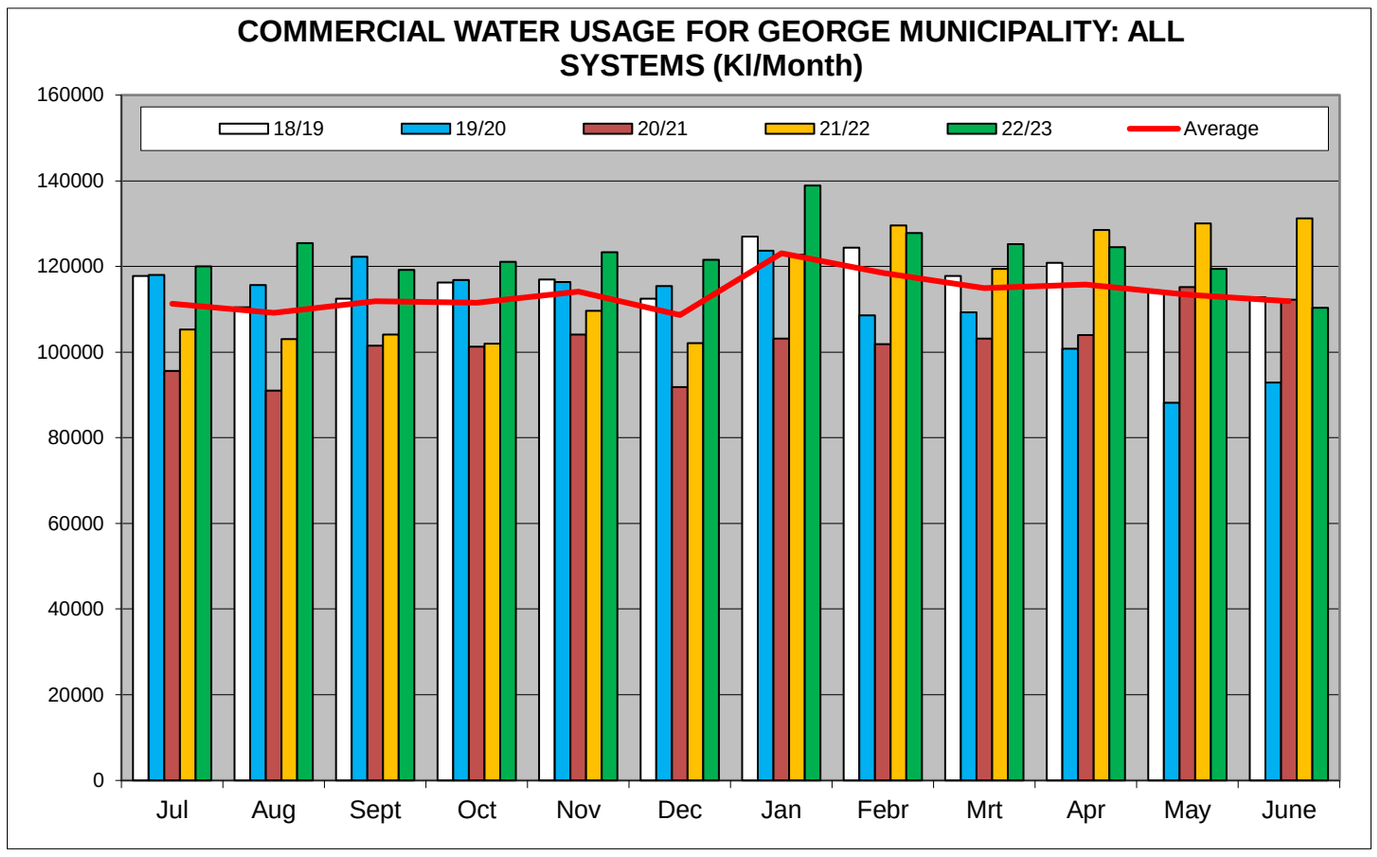

ANNUAL WATER REQUIREMENT FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/a)
18000000
16000000
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
Average annual increase in Raw Water Abstraction Volume from 2018/2019 = 1.46 %/a
Average annual increase in System Input Volume from 2018/2019 = 2.68 %/a
Average annual increase in Billed Metered Consumption from 2018/2019 = 2.85 %/a
2018/2019
2019/2020
2020/2021
2021/2022
2022/2023
Raw Water
System Input Volume
Billed Metered Consumption

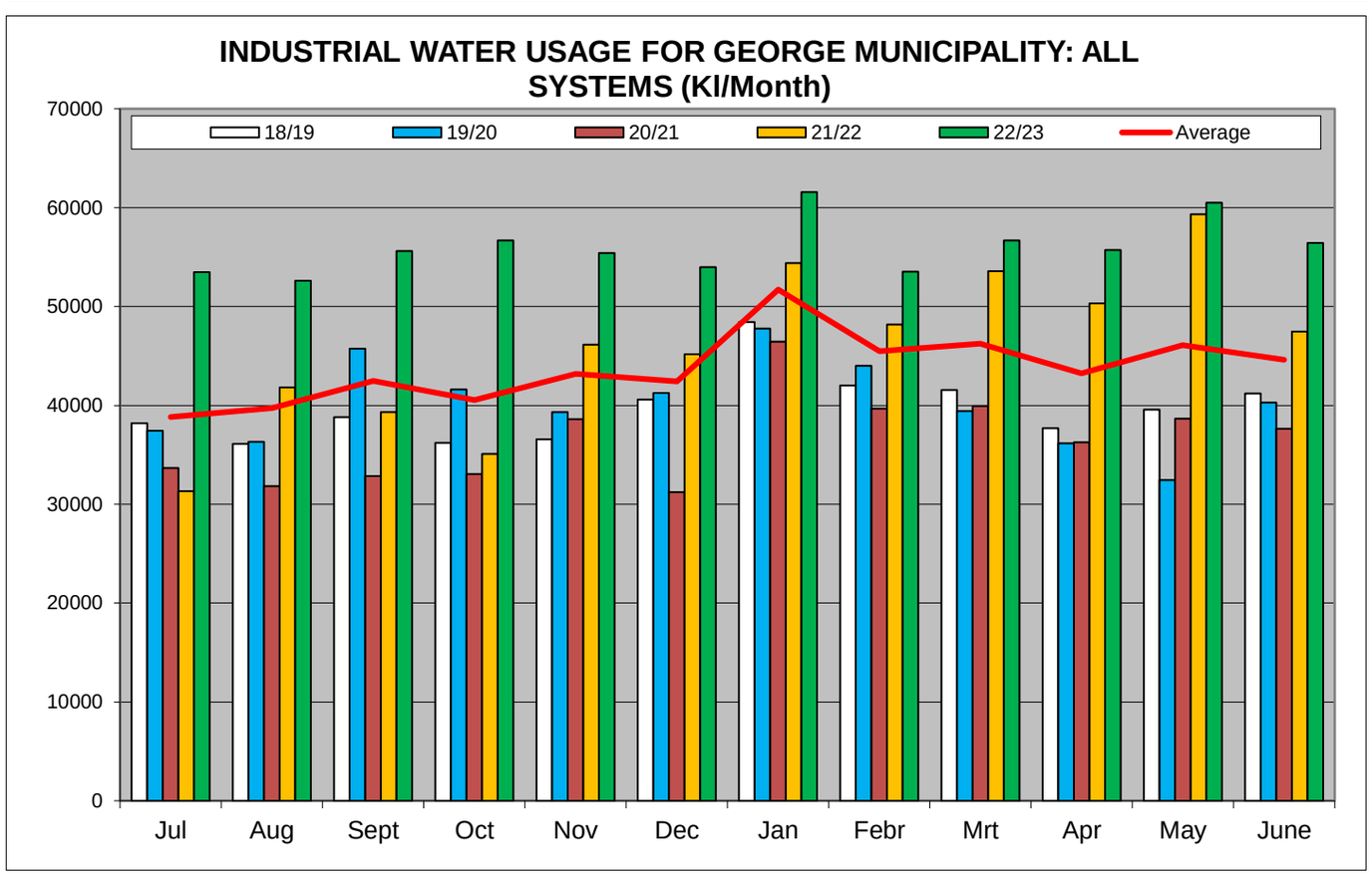

MONTHLY PEAK FACTORS FOR GEORGE MUNICIPALITY: ALL SYSTEMS
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
18/19
19/20
20/21
21/22
22/23
Average (Last 5 yrs)
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun

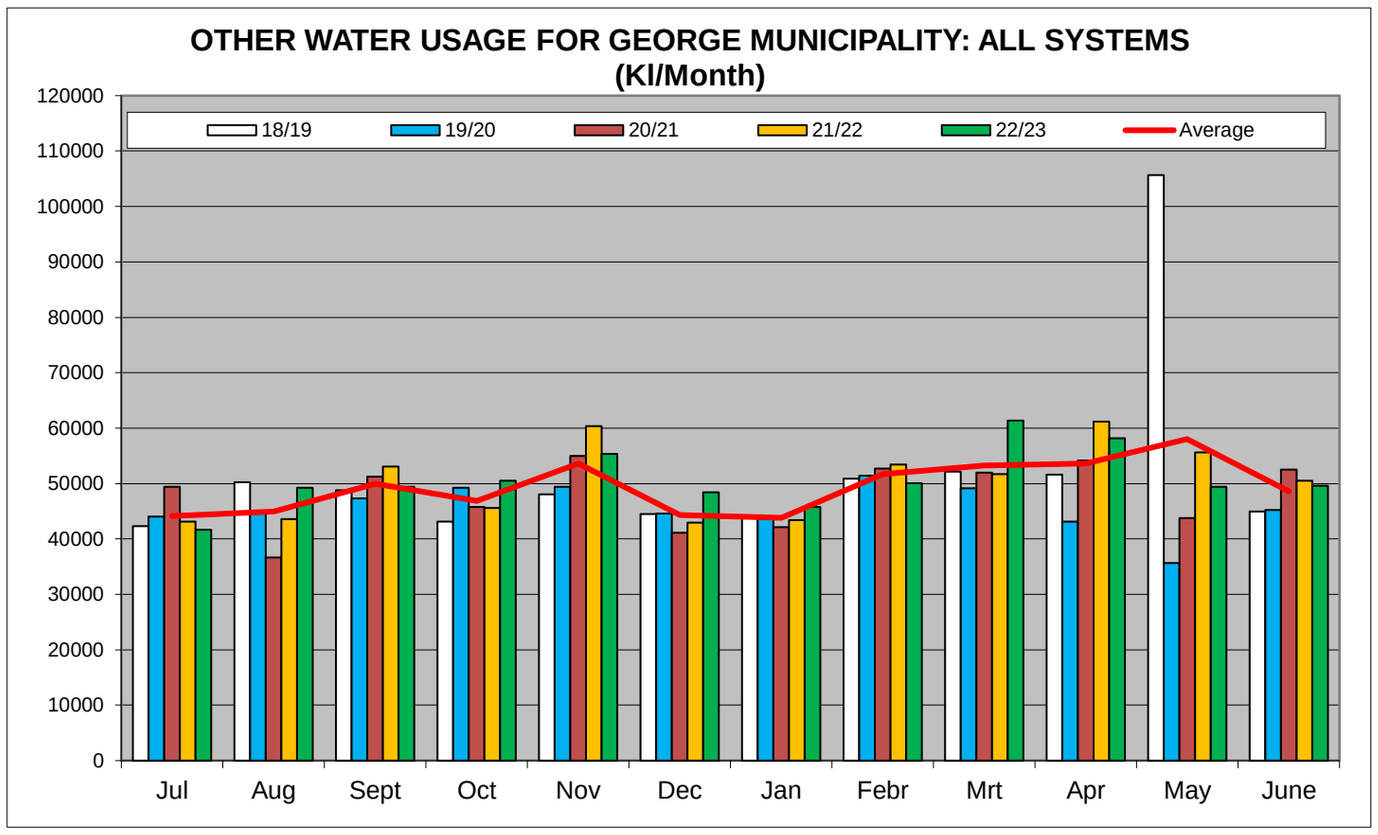

ANNUAL TREATMENT LOSSES, NON REVENUE WATER AND WATER LOSSES FOR GEORGE MUNICIPALITY ALL SYSTEMS (Kl/a)
Treatment Losses
Non Revenue Water
Water Losses
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
2018/2019
2019/2020
2020/2021
2021/2022
2022/2023


ANNUAL WATER USAGE PER SECTOR FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/a)
Industrial
Commercial
Other
Residential
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
2018/2019
2019/2020
2020/2021
2021/2022
2022/2023


RESIDENTIAL WATER USAGE FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/Month)
18/19
19/20
20/21
21/22
22/23
Average
700000
600000
500000
400000
300000
200000
100000
0
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Febr
Mrt
Apr
May
June


COMMERCIAL WATER USAGE FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/Month)
160000
140000
120000
100000
80000
60000
40000
20000
0
18/19
19/20
20/21
21/22
22/23
Average
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Febr
Mrt
Apr
May
June


INDUSTRIAL WATER USAGE FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/Month)
70000
60000
50000
40000
30000
20000
10000
0
18/19
19/20
20/21
21/22
22/23
Average
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Febr
Mrt
Apr
May
June


OTHER WATER USAGE FOR GEORGE MUNICIPALITY: ALL SYSTEMS (Kl/Month)
120000
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
18/19
19/20
20/21
21/22
22/23
Average
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Febr
Mrt
Apr
May
June

GEORGE MUNICIPALITY

Haarlem distribution system

Month	Year	BULK WATER SUPPLY						TREATED WATER SUPPLY													
		Raw Water	System Input Volume	Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)										
		Raw Water Supply to WTW	Treated Water after WTW	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
Jul'09	09/10																				
Aug'09																					
Sep'09																					
Oct'09																					
Nov'09																					
Dec'09																					
Jan'10																					
Feb'10																					
Mrt'10																					
Apr'10																					
May'10																					
Jun'10																					
Jul'10	10/11								11300												
Aug'10									10928												
Sep'10									12908												
Oct'10									12008												
Nov'10									12008												
Dec'10									14907												
Jan'11									12019												
Feb'11									17404												
Mrt'11									15001												
Apr'11									12902												
May'11									11060												
Jun'11									10136												
Jul'11	11/12	8835	8216	619	7.01%	9836	9.91%	8216	7717	0	499	6.1%	10622	11.9%	0	400	99	1.2%	5835	6.5%	
Aug'11		7500	6975	525	7.00%			6975	6477	0	498	7.1%			0	398	100	1.4%			
Sep'11		7424	6867	557	7.50%			6867	6515	0	352	5.1%			0	398	-46	-0.7%			
Oct'11		6160	5636	524	8.51%			5636	5306	0	330	5.9%			0	395	-65	-1.2%			
Nov'11		6252	5658	594	9.50%			5658	5461	0	197	3.5%			0	395	-198	-3.5%			
Dec'11		13000	11050	1950	15.00%			11050	8879	0	2171	19.6%			0	406	1765	16.0%			
Jan'12		13440	10752	2688	20.00%			10752	6615	0	4137	38.5%			0	406	3731	34.7%			
Feb'12		11210	10313	897	8.00%			10313	5665	0	4648	45.1%			0	405	4243	41.1%			
Mrt'12		4930	4585	345	7.00%			4585	10769	0	-6184	-134.9%			0	393	-6577	-143.4%			
Apr'12		5200	4900	300	5.77%			4900	4873	0	27	0.6%			0	394	-367	-7.5%			
May'12		7250	6815	435	6.00%			6815	4934	0	1881	27.6%			0	398	1483	21.8%			
Jun'12		8040	7638	402	5.00%			7638	5572	0	2066	27.0%			0	399	1667	21.8%			
Jul'12	12/13	9550	8958	592	6.20%	8171	6.97%	8958	6309	0	2649	29.6%	13053	12.0%	0	402	2247	25.1%	8227	7.5%	
Aug'12		10880	10118	762	7.00%			10118	7126	0	2992	29.6%			0	404	2588	25.6%			
Sep'12		11510	10762	748	6.50%			10762	7377	0	3385	31.5%			0	406	2979	27.7%			
Oct'12		12450	11579	871	7.00%			11579	7022	0	4557	39.4%			0	407	4150	35.8%			
Nov'12		8330	7664	666	8.00%			7664	7056	0	608	7.9%			0	399	209	2.7%			
Dec'12		6370	5988	382	6.00%			5988	9688	0	-3700	-61.8%			0	396	-4096	-68.4%			
Jan'13		5390	5094	296	5.49%			5094	9365	0	-4271	-83.8%			0	394	-4665	-91.6%			
Feb'13		11860	10793	1067	9.00%			10793	8333	0	2460	22.8%			0	406	2054	19.0%			
Mrt'13		10310	9537	773	7.50%			9537	8809	0	728	7.6%			0	403	325	3.4%			
Apr'13		8920	8384	536	6.01%			8384	8941	0	-557	-6.6%			0	401	-958	-11.4%			
May'13		13730	12769	961	7.00%			12769	7168	0	5601	43.9%			0	410	5191	40.7%			
Jun'13		7950	7433	517	6.50%			7433	8832	0	-1399	-18.8%			0	399	-1798	-24.2%			
Jul'13	13/14	6890	6408	482	7.00%	20178	10.52%	6408	7031	0	-623	-9.7%	84963	49.5%	0	397	-1020	-15.9%	80012	46.6%	
Aug'13		8210	7635	575	7.00%			7635	7903	0	-268	-3.5%			0	399	-667	-8.7%			
Sep'13		6930	6445	485	7.00%			6445	6555	0	-110	-1.7%			0	397	-507	-7.9%			
Oct'13		19538	17975	1563	8.00%			17975	7126	0	10849	60.4%			0	420	10429	58.0%			
Nov'13		16597	15302	1295	7.80%			15302	7133	0	8169	53.4%			0	415	7754	50.7%			
Dec'13		20702	19046	1656	8.00%			19046	6792	0	12254	64.3%			0	422	11832	62.1%			
Jan'14		13261	12067	1194	9.00%			12067	6695	0	5372	44.5%			0	408	4964	41.1%			
Feb'14		18129	15770	2359	13.01%			15770	11450	0	4320	27.4%			0	416	3904	24.8%			
Mrt'14		18514	15425	3089	16.68%			15425	7231	0	8194	53.1%			0	415	7779	50.4%			
Apr'14		20281	17060	3221	15.88%			17060	6881	0	10179	59.7%			0	418	9761	57.2%			
May'14		22849	19900	2949	12.91%			19900	6015	0	13885	69.8%			0	424	13461	67.6%			
Jun'14		19900	18590	1310	6.58%			18590	5848	0	12742	68.5%			0	421	12321	66.3%			
Jul'14	14/15	18078	16802	1276	7.06%	31310	14.86%	16802	4418	0	12384	73.7%	96549	53.8%	0	418	11967	71.2%	91582	51.0%	
Aug'14		13107	12147	960	7.32%			12147	5167	0	6980	57.5%			0	408	6572	54.1%			
Sep'14		15560	14216	1344	8.64%			14216	7634	0	6582	46.3%			0	412	6169	43.4%			
Oct'14		17109	14665	2444	14.28%			14665	6917	0	7748	52.8%			0	413	7335	50.0%			
Nov'14		18800	13790	5010	26.65%			13790	7181	0	6609	47.9%			0	412	6198	44.9%			
Dec'14		21978	19936	2042	9.29%			19936	7716	0	12220	61.3%			0	424	11796	59.2%			
Jan'15		24082	22369	1713	7.11%			22369	10254	0	12115	54.2%			0	429	11686	52.2%			
Feb'15		21566	17735	3831	17.76%			17735	8504	0	9231	52.1%			0	419	8812	49.7%			
Mrt'15		17887	9753	8134	45.47%			9753	7520	0	2233	22.9%			0	404	1830	18.8%			
Apr'15		15532	14191	1341	8.63%			14191	6707	0	7484	52.7%			0	412	7071	49.8%			
May'15		14282	12264	2018	14.13%			12264	5513	0	6751	55.0%			0	409	6342	51.7%			
Jun'15		12782	11585	1197	9.36%			11585	5374	0	6211	53.6%			0	407	5804	50.1%			
Jul'15	15/16	15024	13937	1087	7.24%	15111	7.26%	13937	7471	0	6466	46.4%	100920	52.3%	0	412	6054	43.4%	95926	49.7%	
Aug'15		17004	15761	1243	7.31%			15761	5862	0	9899	62.8%			0	416	9483	60.2%			
Sep'15		16822	15236	1586	9.43%			15236	6614	0	8622	56.6%			0	414	8208	53.9%			
Oct'15		17647	16346	1301	7.37%			16346	5965	0	10381	63.5%			0	417	9964	61.0%			
Nov'15		13641	12497	1144	8.39%			12497	6875	0	5622	45.0%			0	409	5213	41.7%			
Dec'15		19902	18681	1221	6.14%			18681	8644	0	10037	53.7%			0	421	9616	51.5%			
Jan'16		22016	20667	1349	6.13%			20667	10726	0	9941	48.1%			0	425	9516	46.0%			
Feb'16		18312	16766	1546	8.44%			16766	9326	0	7440	44.4%			0	418	7022	41.9%			
Mrt'16		17357	16125	1232	7.10%			16125	8216	0	7909	49.0%			0	416	7493	46.5%			
Apr'16		17357	16125	1232	7.10%			16125	7651	0	8474	52.6%			0	416	8058	50.0%			
May'16		16932	15897	1035	6.11%			15897	7236	0	8661	54.5%			0	416	8245	51.9%			
Jun'16		16208	15073	1135	7.00%			15073	7605	0	7468	49.5%			0	414	7054	46.8%			
Jul'16	16/17	14195	10516	3679	25.92%	13671	6.73%	10516	6645	0	3871	36.8%	95779	50.5%	0	405	3466	33.0%	90792	47.9%	
Aug'16		13888	12909	979	7.05%			12909	6911	0	5998	46.5%			0	410	5588	43.3%			
Sep'16		14412	13794	618	4.29%			13794	8489	0	5305	38.5%			0	412	4893	35.5%			
Oct'16		19123	18116	1007	5.27%			18116	8796	0	9320	51.4%			0	420	8900	49.1%			
Nov'16		20342	19055	1287	6.33%			19055	8194	0	10861	57.0%			0	422	10439	54.8%			
Dec'16		19791	19128	663	3.35%			19128	7926	0	11202	58.6%			0	422	10780	56.4%			
Jan'17		21572	20921	651	3.02%			20921	10357	0	10564	50.5%			0	426	10138	48.5%			
Feb'17		15137	14825	312	2.06%			14825	7822	0	7003	47.2%			0	414	6589	44.4%			
Mrt'17		18517	17891	626	3.38%			17891	7151	0	10740	60.0%			0	420	10320	57.7%			
Apr'17		15206	14692	514	3.38%			14692	7579	0	7113	48.4%			0	413	6700	45.6%			
May'17		15358	14544	814	5.30%			14544	7219	0	7325	50.4%			0	413	6912	47.5%			
Jun'17		15689	13168	2521	16.07%			13168	6691	0	6477	49.2%			0	410	6067	46.1%			
Jul'17	17/18	21102	14308	6794	32.20%	18994	9.79%	14308	6693	0	7615	53.2%	93713	53.5%	0	413	7202	50.3%	88755	50.7%	
Aug'17		18886	11785	7101	37.60%			11785	6250	0	5535	47.0%			0	408	5127	43.5%			
Sep'17		12357	11666	691	5.59%			11666	6022	0	5644	48.4%			0	407	5237	44.9%			
Oct'17		17074	15928	1146	6.71%			15928	6418	0	9510	59.7%			0	416	9094	57.1%			
Nov'17		17010	16679	331	1.95%			16679	7100	0	9579	57.4%			0	417	9162	54.9%			
Dec'17		19864	19752	112	0.56%			19752	7374	0	12378	62.7%			0	424	11954	60.5%			
Jan'18		17738	17382	356	2.01%			17382	8820	0	8562	49.3%			0	419	8143	46.8%			
Feb'18		14905	14565	340	2.28%			14565	7373	0	7192	49.4%			0	413	6779	46.5%			
Mrt'18		16425	15548	877	5.34%			15548	6277	0	9271	59.6%			0	415	8856	57.0%			
Apr'18		14640	14018	622	4.25%			14018	6086	0	7932	56.6%			0	412	7520	53.6%			
May'18		12548	12200	348	2.77%			12200	6804	0	5396	44.2%			0	408	4988	40.9%			
Jun'18		11535	11259	276	2.39%			11259	6160	0	5099	45.3%			0	407	4692	41.7%			
Jul'18	18/19	12576	11758	818	6.50%	7545	3.87%	11758	5106	0	6652	56.6%	110344	58.9%	0	492	6160	52.4%	104353	55.7%	
Aug'18		25986	25882	104	0.40%			25882	6075	0	19807	76.5%			0	520	19287	74.5%			
Sep'18		13796	13713	83	0.60%			13713	5711	0	8002	58.4%			0	495	7507	54.7%			
Oct'18		15650	15599	51	0.33%			15599	6022	0	9577	61.4%			0	499	9078	58.2%			
Nov'18		18296	16842	1454	7.95%			16842	6737	0	10105	60.0%			0	502	9603	57.0%			
Dec'18		20065	19065	1000	4.98%			19065	6311	0	12754	66.9%			0	506	12248	64.2%			
Jan'19		19312	18534	778	4.03%			18534	8853	0	9681	52.2%			0	505	9176	49.5%			
Feb'19		15166	14635	531	3.50%			14635	6796	0	7839	53.6%			0	497	7342	50.2%			
Mrt'19		14536	13809	727	5.00%			13809	5982	0	7827	56.7%			0	496	7331	53.1%			
Apr'19		13197	12603	594	4.50%			12603	6951	0	5652	44.8%			0	493	5159	40.9%			
May'19		13861	13201	660	4.76%			13201	6553	0	6648	50.4%			0	494	6154	46.6%			
Jun'19		12412	11667	745	6.00%			11667	5867	0	5800	49.7%			0	491	5309	45.5%			
Jul'19	19/20	16542	13987	2555	15.45%	15340	8.45%	13987	5613	0	8374	59.9%	83722	50.4%	0	376	7998	57.2%	79214	47.7%	
Aug'19		12933	12286	647	5.00%			12286	6124	0	6162	50.2%			0	373	5789	47.1%			
Sep'19		17640	15315	2325	13.18%			15315	6223	0	9092	59.4%			0	379	8713	56.9%			
Oct'19		16780	15027	1753	10.45%			15027	6939	0	8088	53.8%			0	378	7710	51.3%			
Nov'19		16410	15777	633	3.86%			15777	6920	0	8857	56.1%			0	380	8477	53.7%			
Dec'19		17674	16790	884	5.00%			16790	7639	0	9151	54.5%			0	382	8769	52.2%			
Jan'20		15429	14658	771	5.00%			14658	8940	0	5718	39.0%			0	377	5341	36.4%			
Feb'20		13464	12326	1138	8.45%			12326	6804	0	5522	44.8%			0	373	5150	41.8%			
Mrt'20		14511	13785	726	5.00%			13785	6983	0	6802	49.3%			0	376	6426	46.6%			
Apr'20		12928	12282	646	5.00%			12282	7364	0	4918	40.0%			0	373	4545	37.0%			
May'20		12281	11667	614	5.00%			11667	6301	0	5366	46.0%			0	371	4995	42.8%			
Jun'20		14938	12290	2648	17.73%			12290	6618	0	5672	46.2%			0	373	5299	43.1%			
Jul'20	20/21	14938	13772	1166	7.81%	15318	7.77%	13772	6196	30	7546	54.8%	105529	58.1%	0	820	6726	48.8%	95662	52.6%	
Aug'20		14136	12618	1518	10.74%			12618	6169	30	6419	50.9%			0	817	5602	44.4%			
Sep'20		16255	14822	1433	8.82%			14822	5173	30	9619	64.9%			0	822	8797	59.4%			
Oct'20		15571	12086	3485	22.38%			12086	5983	30	6073	50.2%			0	816	5257	43.5%			
Nov'20		16441	15918	523	3.18%			15918	7132	30	8756	55.0%			0	824	7932	49.8%			
Dec'20		18424	17732	692	3.76%			17732	5575	30	12127	68.4%			0	827	11300	63.7%			
Jan'21		18841	18118	723	3.84%			18118	6564	30	11524	63.6%			0	828	10696	59.0%			
Feb'21		18152	17140	1012	5.58%			17140	7001	30	10109	59.0%			0	826	9283	54.2%			
Mrt'21		17695	16567	1128	6.37%			16567	5749	30	10788	65.1%			0	825	9963	60.1%			
Apr'21		16936	15890	1046	6.18%			15890	5745	30	10115	63.7%			0	824	9291	58.5%			
May'21		14847	13673	1174	7.91%			13673	8539	30	5104	37.3%			0	819	4285	31.3%			
Jun'21		14806	13388	1418	9.58%			13388	6009	30	7349	54.9%			0	819	6530	48.8%			
Jul'21	21/22	12149	11102	1047	8.62%	27829	14.09%	11102	5039	45	6018	54.2%	92225	54.3%	0	991	5027	45.3%	80258	47.3%	
Aug'21		12715	11680	1035	8.14%			11680	6177	45	5458	46.7%			0	992	4466	38.2%			
Sep'21		17284	15864	1420	8.22%			15864	5834	45	9985	62.9%			0	1001	8984	56.6%			
Oct'21		16996	14753	2243	13.20%			14753	3268	45	11440	77.5%			0	999	10441	70.8%			
Nov'21		16150	13384	2766	17.13%			13384	8355	45	4984	37.2%			0	996	3988	29.8%			
Dec'21		18814	16719	2095	11.14%			16719	7267	45	9407	56.3%			0	1002	8405	50.3%			
Jan'22		20078	18896	1182	5.89%			18896	7146	45	11705	61.9%			0	1007	10698	56.6%			
Feb'22		17345	15983	1362	7.85%			15983	8136	45	7802	48.8%			0	1001	6801	42.6%			
Mrt'22		16941	14451	2490	14.70%			14451	6105	45	8301	57.4%			0	998	7303	50.5%			
Apr'22		14460	12851	1609	11.13%			12851	6006	45	6800	52.9%			0	995	5805	45.2%			
May'22		21854	12861	8993	41.15%			12861	6427	45	6389	49.7%			0	995	5394	41.9%			
Jun'22		12764	11177	1587	12.43%			11177	7196	45	3936	35.2%			0	991	2945	26.3%			
Jul'22	22/23	13281	11349	1932	14.55%	13978	7.62%	11349	6515	105	4729	41.7%	79295	46.8%	0	896	3833	33.8%	68480	40.4%	
Aug'22		14485	12993	1492	10.30%			12993	7224	105	5664	43.6%			0	899	4765	36.7%			
Sep'22		13331	11818	1513	11.35%			11818	5997	105	5716	48.4%			0	897	4819	40.8%			
Oct'22		15978	14569	1409	8.82%			14569	7274	105	7190	49.4%			0	902	6288	43.2%			
Nov'22		14901	16206	-1305	-8.76%			16206	7843	105	8258	51.0%			0	905	7353	45.4%			
Dec'22		25058	19895	5163	20.60%			19895	7445	105	12345	62.1%			0	913	11432	57.5%			
Jan'23		18217	16812	1405	7.71%			16812	8272	105	8435	50.2%			0	907	7528	44.8%			
Feb'23		15080	12992	2088	13.85%			12992	7705	105	5182	39.9%			0	899	4283	33.0%			
Mrt'23		11423	14606	-3183	-27.86%			14606	9066	105	5435	37.2%			0	902	4533	31.0%			
Apr'23		15305	14135	1170	7.64%			14135	7008	105	7022	49.7%			0	901	6121	43.3%			
May'23		13510	12605	905	6.70%			12605	6953	105	5547	44.0%			0	898	4649	36.9%			
Jun'23		12911	11522	1389	10.76%			11522	7645	105	3772	32.7%			0	896	2876	25.0%			

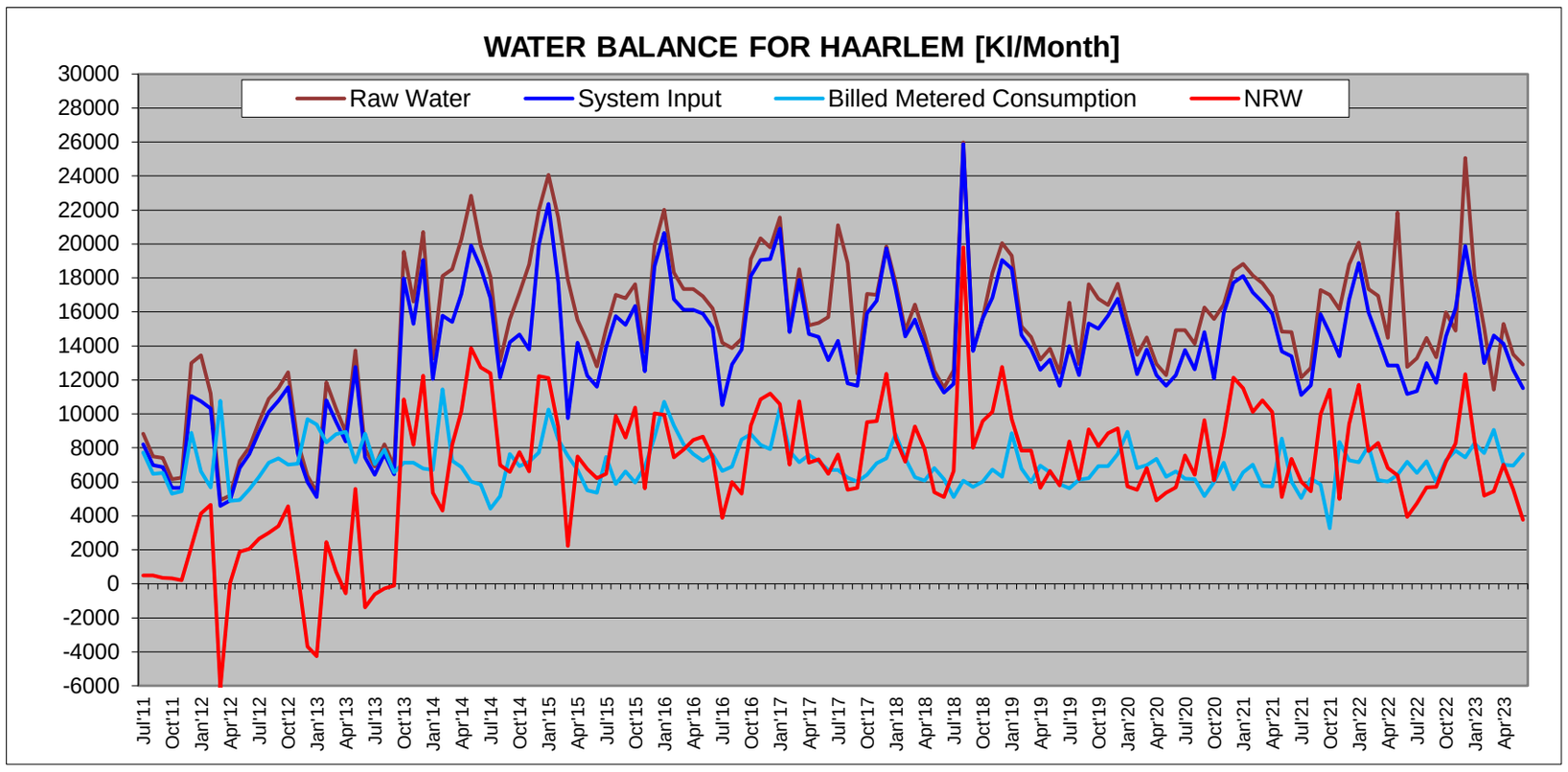
Month	Year	BULK WATER SUPPLY						TREATED WATER SUPPLY												
		Raw Water	System Input Volume	Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)									
		Raw Water Supply to WTW	Treated Water after WTW	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
2010/2011																				
2011/2012		99241	89405			9836	9.91%	89405	78783	0			10622	11.88%	0	4787			5835	6.53%
2012/2013		117250	109079			8171	6.97%	109079	96026	0			13053	11.97%	0	4826			8227	7.54%
2013/2014		191801	171623			20178	10.52%	171623	86660	0			84963	49.51%	0	4951			80012	46.62%
2014/2015		210763	179453			31310	14.86%	179453	82904	0			96549	53.80%	0	4967			91582	51.03%
2015/2016		208222	193111			15111	7.26%	193111	92191	0			100920	52.26%	0	4994			95926	49.67%
2016/2017		203230	189559			13671	6.73%	189559	93780	0			95779	50.53%	0	4987			90792	47.90%
2017/2018		194084	175090			18994	9.79%	175090	81377	0			93713	53.52%	0	4958			88755	50.69%
2018/2019		194853	187308			7545	3.87%	187308	76964	0			110344	58.91%	0	5991			104353	55.71%
2019/2020		181530	166190			15340	8.45%	166190	82468	0			83722	50.38%	0	4508			79214	47.66%
2020/2021		197042	181724			15318	7.77%	181724	75835	360			105529	58.07%	0	9867			95662	52.64%
2021/2022		197550	169721			27829	14.09%	169721	76956	540			92225	54.34%	0	11967			80258	47.29%
2022/2023		183480	169502			13978	7.62%	169502	88947	1260			79295	46.78%	0	10815			68480	40.40%

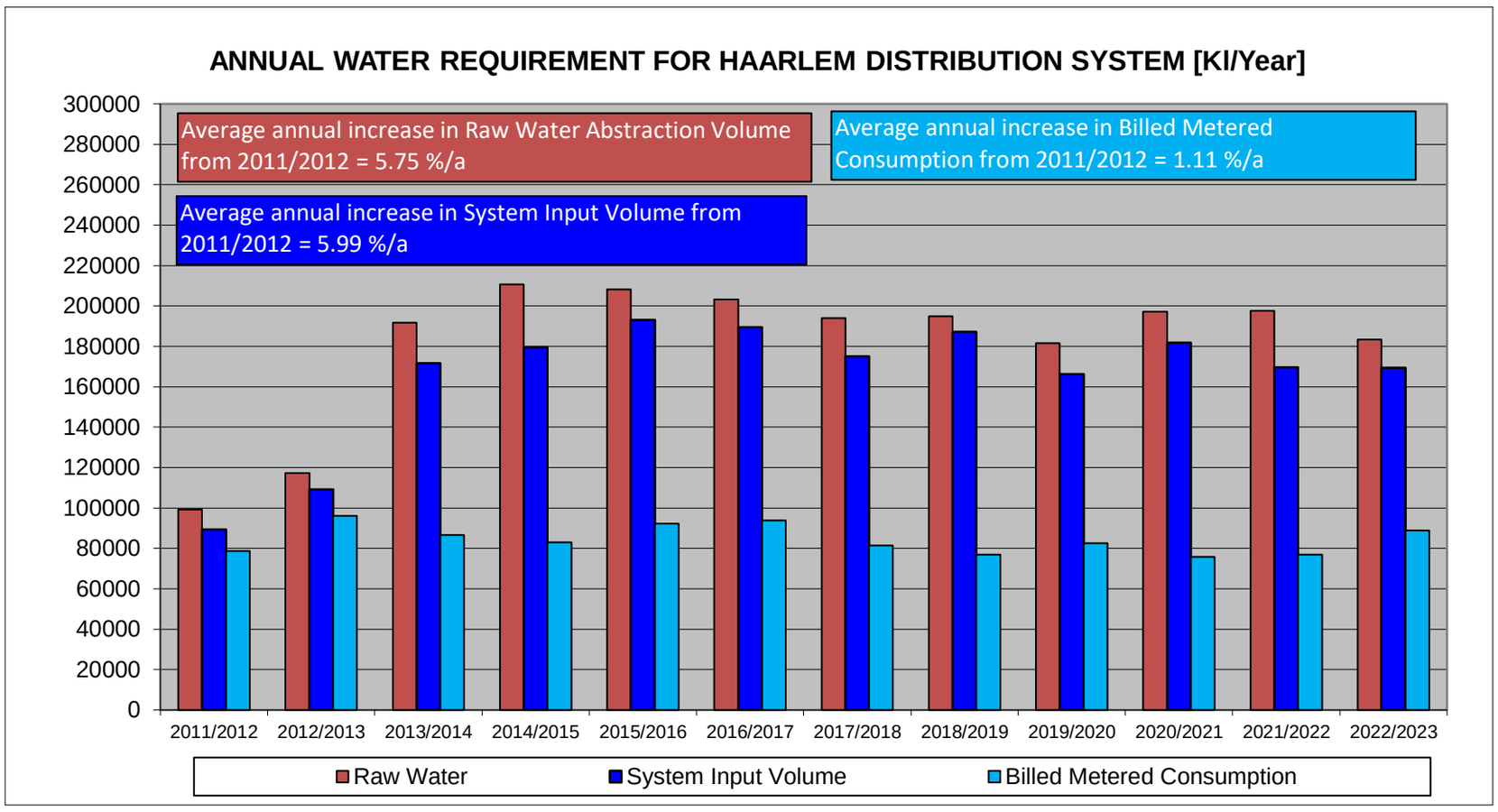
Water Balance Components		Water Balance Volumes								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Consumer Units	Number of connections	377	514	494	494	509	512	515	507	516
System Input Volume	l/connection/day	1304	1029	1051	971	1008	889	967	917	900
Average Billed Metered Cons.	l/connection/day	602	491	520	451	414	441	403	416	472
Non-Revenue Water	l/connection/day	702	538	531	520	594	448	563	501	428

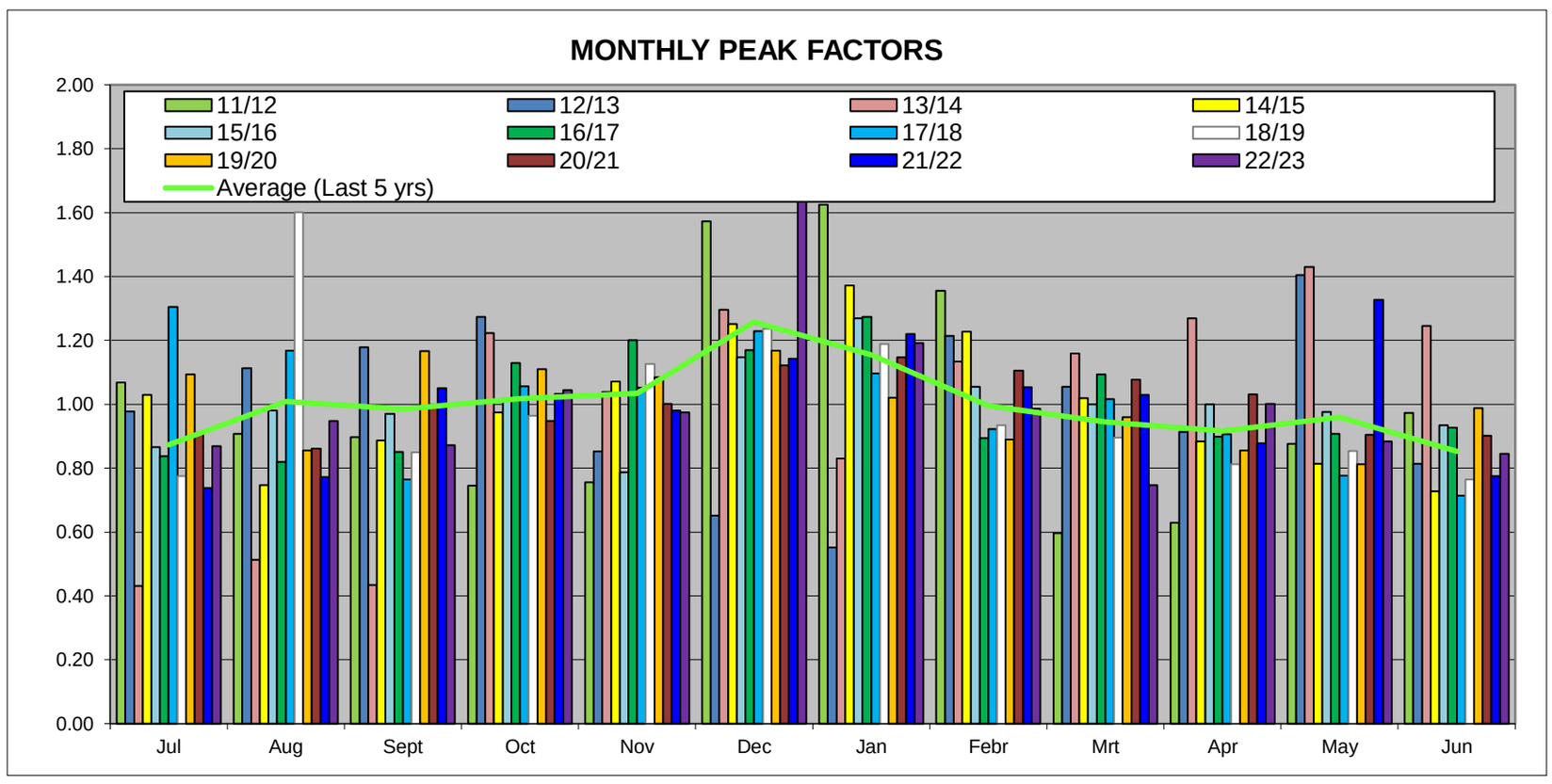
Water Balance Components		Percantage Change in Volumes in l/connection/day, year on year								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume	% Change in Volume	-	-21.07%	2.13%	-7.63%	3.83%	-11.79%	8.71%	-5.13%	-1.87%
Average Billed Metered Cons.	% Change in Volume	-	-18.44%	5.84%	-13.23%	-8.21%	6.52%	-8.58%	3.08%	13.57%
Non-Revenue Water	% Change in Volume	-	-23.33%	-1.25%	-2.16%	14.28%	-24.57%	25.74%	-11.01%	-14.68%

Water Balance Components		Did volume in l/connection/day Rise or Fall, year on year?								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume	Rise or Fall	-	Fall	Rise	Fall	Rise	Fall	Rise	Fall	Fall
Average Billed Metered Cons.	Rise or Fall	-	Fall	Rise	Fall	Fall	Rise	Fall	Rise	Rise
Non-Revenue Water	Rise or Fall	-	Fall	Rise	Fall	Rise	Fall	Rise	Fall	Fall

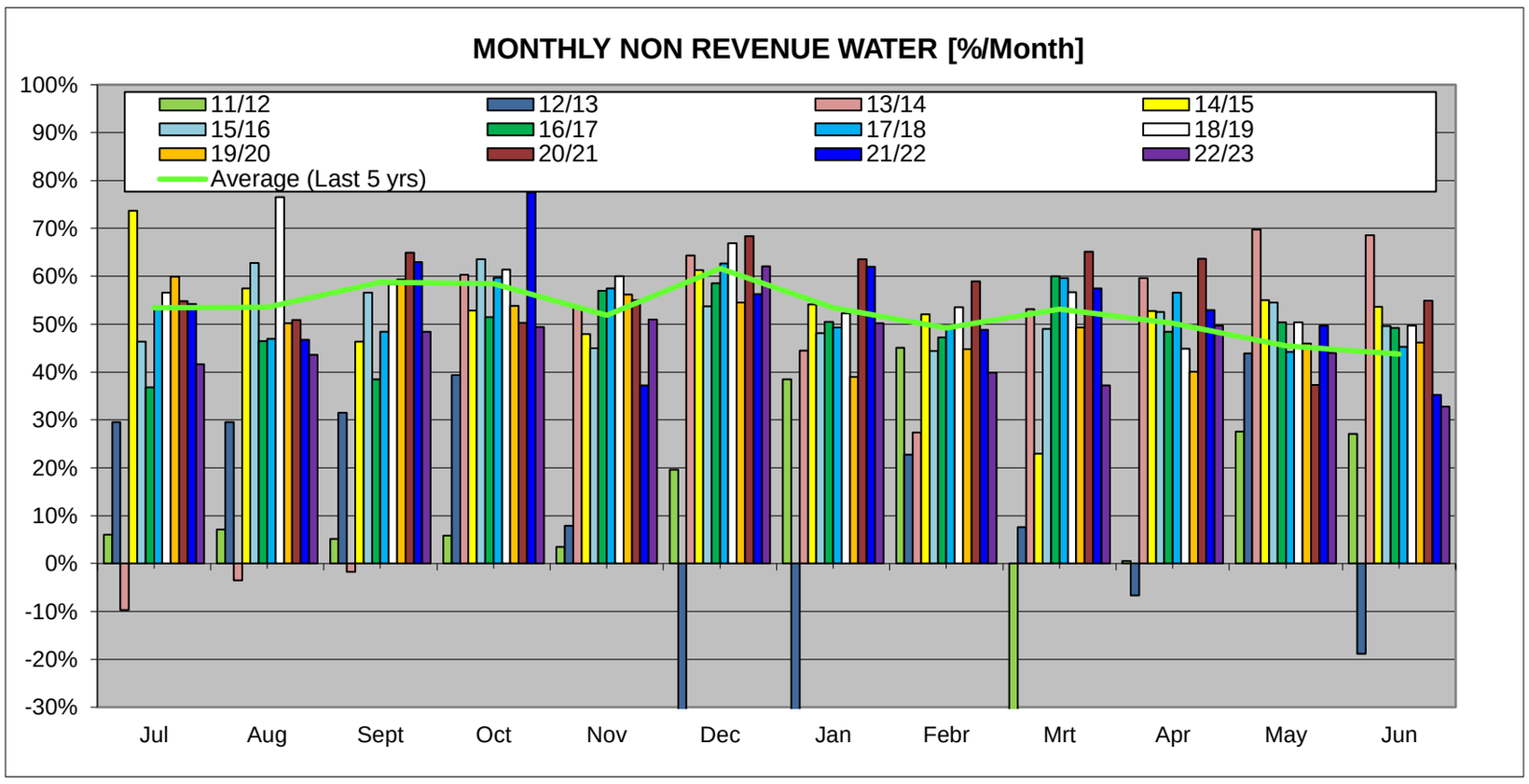
WATER BALANCE FOR HAARLEM

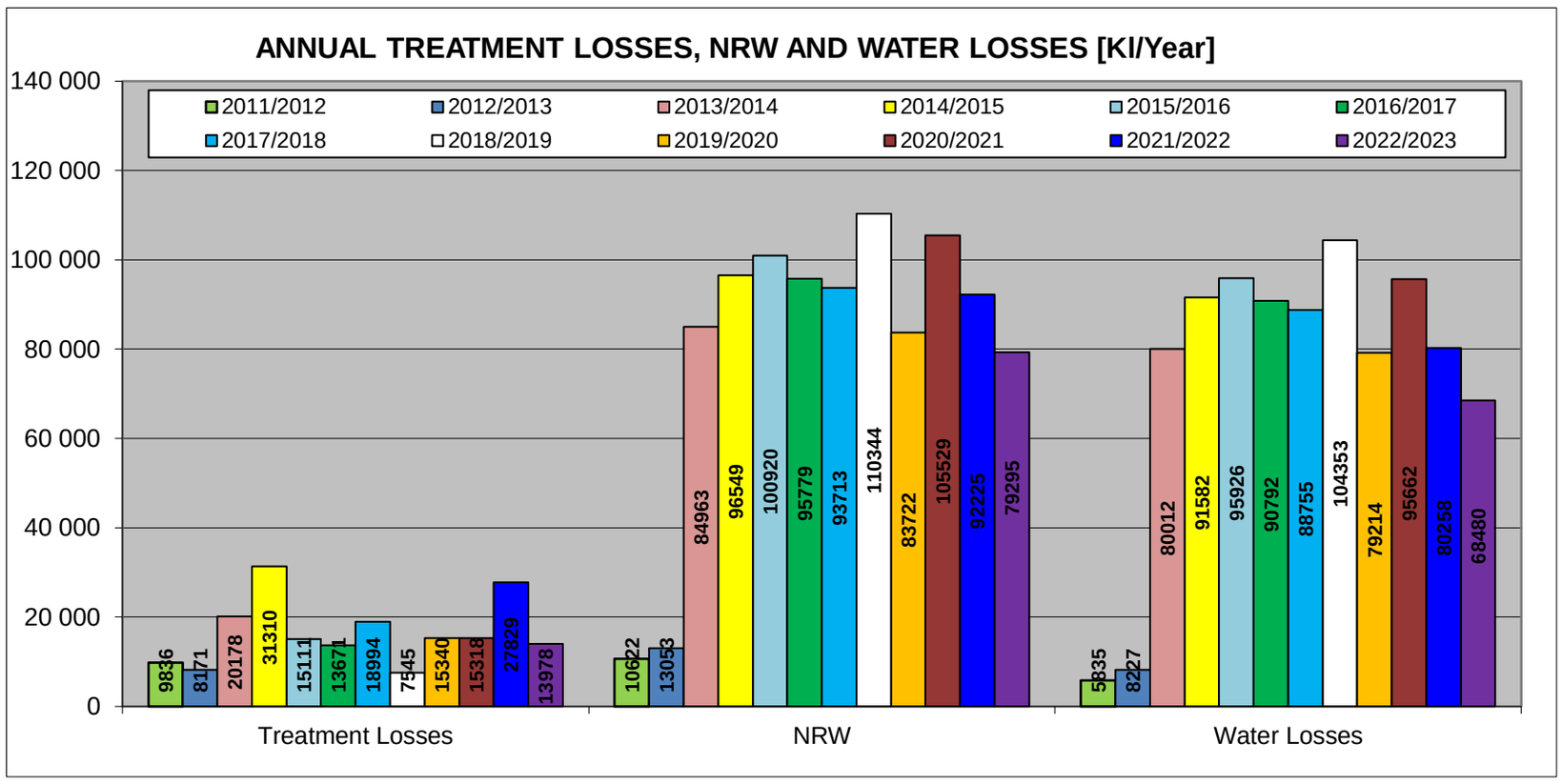


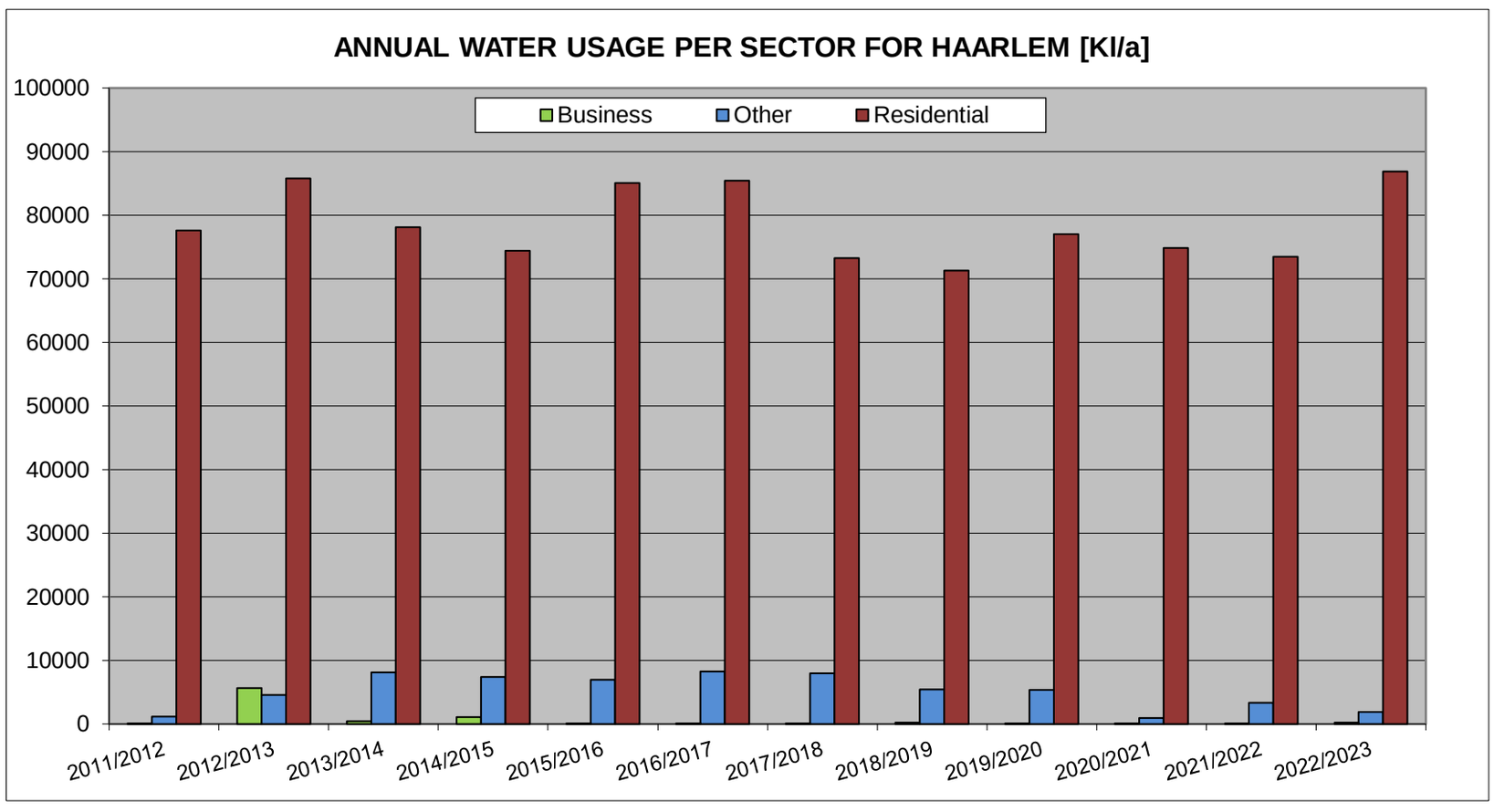




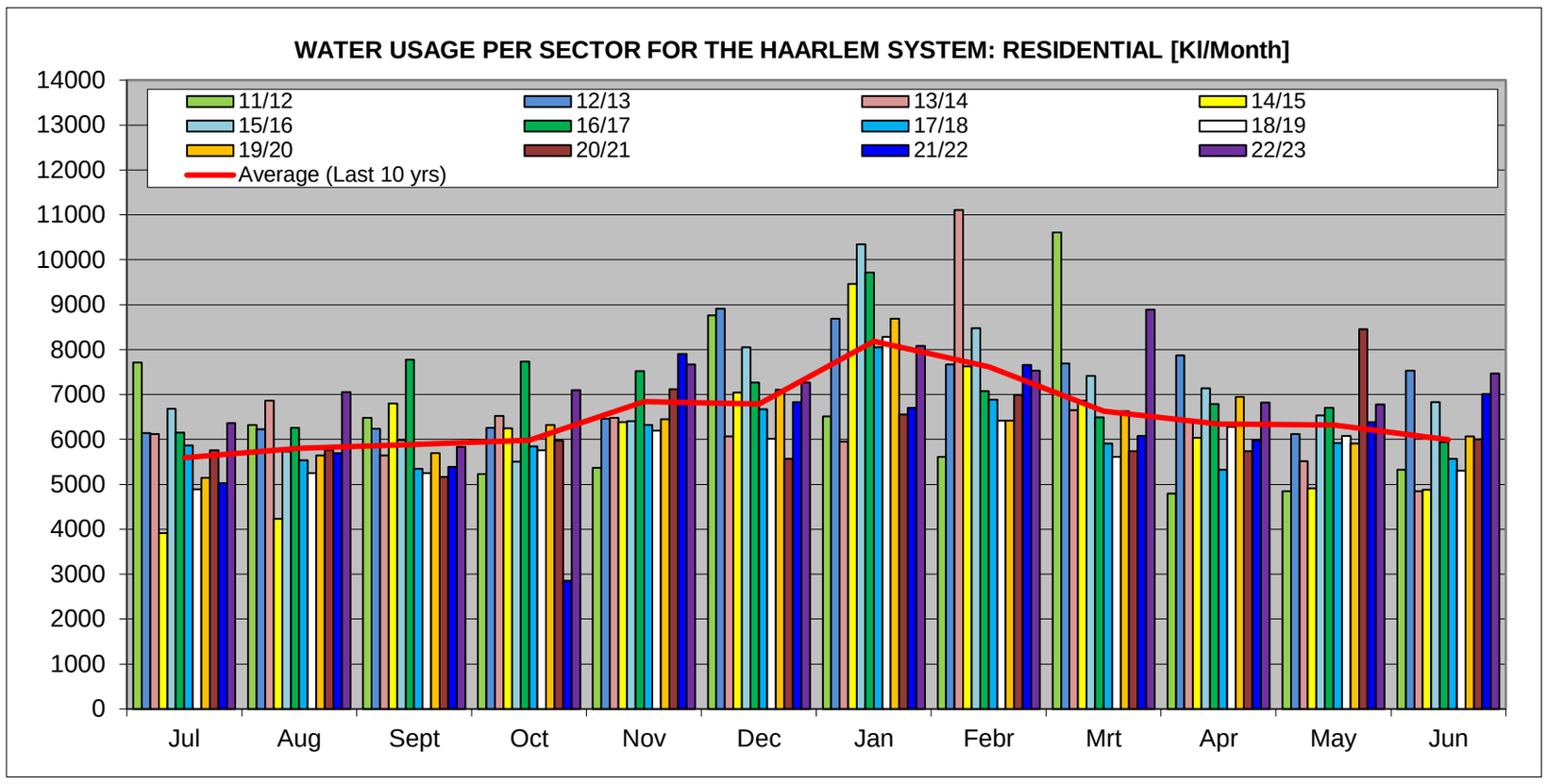
WATER BALANCE FOR HAARLEM

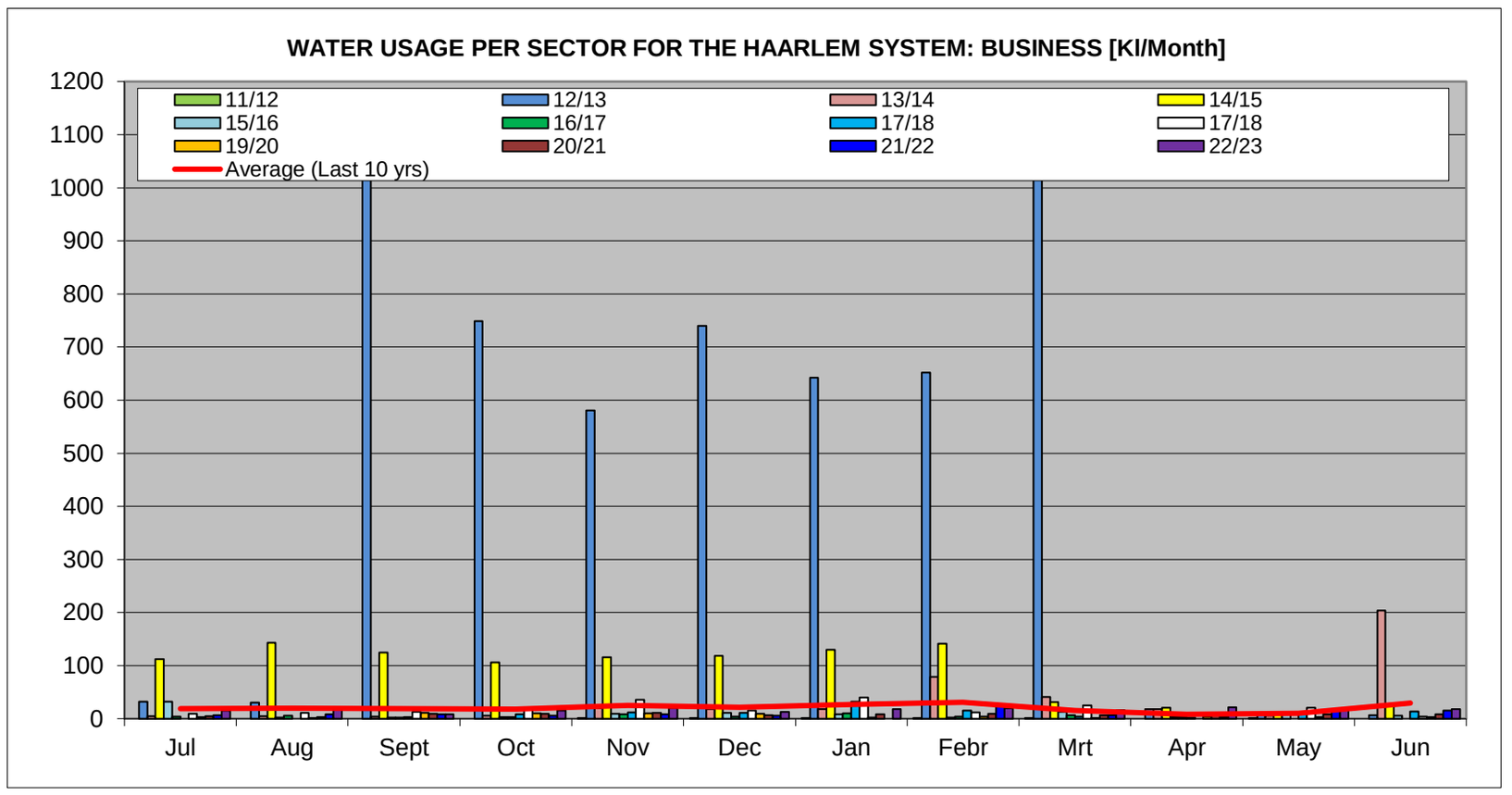


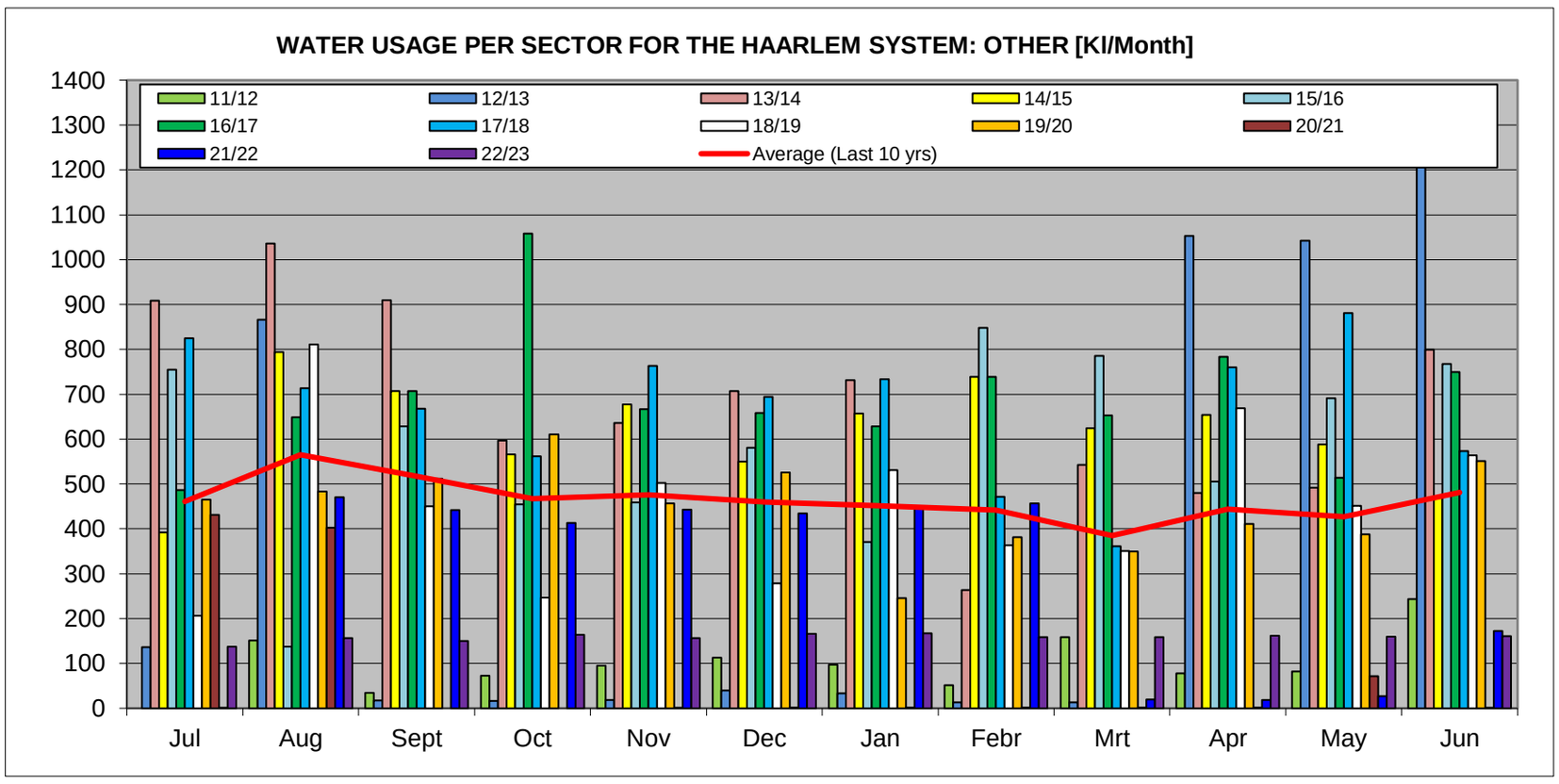




WATER BALANCE FOR HAARLEM







Rainfall and WWTWs flows

Date	Gwaing WWTW								Outeniqua WWTW											Herold's Bay WWTW								Kleinkrantz WWTW								Uniondale								% of Billed Metered Consumption 60%								Haarlem					% of Billed Metered Consumption 35%					Total WWTWs			
	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Recycled Water	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Discharge to River		Re-use on Site	Pumped to GRD	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Capacity
	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	kl/d	ML	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d
Jan-01	47	229	7387	3600					87	286	9226	12500										300								1100																																							
Feb-01	25	193	6893	3600					30	250	8929	12500										300								1100																																						
Mar-01	66	205	6613	3600					100	314	10129	12500										300								1100																																						
Apr-01	129	282	9400	3600					137	395	13151	12500										300								1100																																						
May-01	13	184	5935	3600					22	233	7516	12500										300								1100																																						
Jun-01	10	149	4967	3600					16	210	7000	12500										300								1100																																						
Jul-01	35	150	4839	3600					45	189	6097	12500										300								1100																																						
Aug-01	74	186	6000	3600					92	222	7150	12500										300								1100																																						
Sep-01	53	194	6467	3600					42	231	7706	12500										300								1100																																						
Oct-01	64	211	6806	3600					65	237	7645	12500										300								1100																																						
Nov-01	185	321	10700	3600					185	371	12352	12500										300								1100																																						
Dec-01	14	237	7645	3600					14	281	9065	12500										300								1100																																						
Jan-02	87	239	7710	3600					49	283	9129	12500										300								1100																																						
Feb-02	38	220	7857	3600					38	291	10381	12500										300								1100																																						
Mar-02	7	185	5968	3600					7	244	7885	12500										300								1100																																						
Apr-02	42	166	5533	3600					42	219	7311	12500										300								1100																																						
May-02	49	171	5516	3600					49	226	7288	12500										300	12.0	6.923	223	1100																																										
Jun-02	59	154	5133	3600					59	203	6782	12500										300	67.0	6.134	204	1100																																						
Jul-02	69	168	5419	3600					55	245	7903	12500										300	41.3	8.844	285	1100																																						
Aug-02	85	219	7065	3600					85	266	8581	12500										300	64.0	8.902	287	1100																																						
Sep-02	106	304	10133	3600					110	229	7633	12500										300	75.0	9.412	314	1100																																						
Oct-02	8	162	5226	3600					2	211	6806	12500										300	5.5	11.364	367	1100																																						
Nov-02	53	161	5367	3600					69	234	7800	12500										300	37.5	10.576	353	1100																																						
Dec-02	39	170	5484	3600					24	263	8484	12500										300	59.0	12.876	415	1100																																						
Jan-03	53	193	6226	3600					17	270	8710	12500										300	25.5	11.966	386	1100																																						
Feb-03	46	176	6286	3600					155	275	9821	12500										300	21.0	11.816	422	1100																																						
Mar-03	233	350	11290	3600					223	258	8323	12500										300	181.0	18.015	581	1100																																						
Apr-03	54	153	6433	3600					58	260	8667	12500										300	54.5	14.697	490	1100																																						
May-03	135	311	10032	3600					119	282	9097	12500										300	108.0	14.156	457	1100																																						
Jun-03	36	188	6267	3600					32	233	7767	12500										300	22.5	11.692	390	1100																																						
Jul-03	30	179	5774	3600					20	225	7258	12500										300	38.0	15.351	495	1100																																						
Aug-03	67	184	5935	3600					25	306	9871	12500										300	34.0	14.703	474	1100																																						
Sep-03	32	168	5600	3600					28	291	9700	12500										300	29.0	20.130	671	1100																																						
Oct-03	52	190	6129	3600					50	306	9871	12500										300	47.1	20.037	646	1100																																						
Nov-03	22	170	5667	3600					20	298	9933	12500										300	14.0	20.440	681	1100																																						
Dec-03	37	179	5774	3600					44	322	10387	12500										300	50.0	20.844	672	1100																																						
Jan-04	52	184	5935	3600					39	311	10032	12500										300	24.5	21.247	685	1100																																						
Feb-04	70	189	6517	3600					69	279	9621	12500										300	51.0	21.650	747	1100																																						
Mar-04	93	205	6613	3600					77	294	9484	12500										300	105.5	31.945	1030	1100																																						
Apr-04	61	177	5900	3600					56	286	9533	12500										300	44.0	29.323	977	1100																																						
May-04	16	136	4387	3600					11	273	8806	12500										300	28.5	26.705	861	1100																																						
Jun-04	44	130	4333	3600					50	270	9000	12500										300	43.0	24.088	803	1100																																						
Jul-04	28	116	3742	3600					20	250	8065	12500										300	16.0	21.403	690	1100																																						
Aug-04	68	135	4355	3600					55	281	9065	12500										300	60.3	22.362	721	1100																																						
Sep-04	70	181	6033	3600					60	307	10233	12500										300	49.0	20.198	673	1100																																						
Oct-04	103	220	7097	3600					80	356	11484	12500										300	53.5	19.802	639	1100																																						
Nov-04	26	166	5533	3600					18	312	10400	12500										300	14.5	21.147	705	1100																																						
Dec-04	224	215	6935	3600					208	343	11065	12500										300	213.0	31.483	1016	1100																																						
Jan-05	99	199	6419	3600					87	327	10548	15000										300	114.0	27.727	894	1100																																						
Feb-05	44	197	7036	3600					73	239	8536	15000										300	48.0	20.580	735	1100																																						
Mar-05	71	192	6194	3600					38	226	7290	15000										300	101.0	23.947	772	1100																																						
Apr-05	113	216	7200	3600					79	311	10367	15000										300	65.0	17.695	590	1100																																						
May-05	42	191	6161	3600					44	256	8258	15000										300	50.0	19.254	621	1100																																						
Jun-05	47	197	6567	3600					38	261	8700	15000										300	47.0	17.915	597	1100																																						
Jul-05	10	145	4677	3600					0	254	8194	15000										300	16.0	19.083	616	1100																																						
Aug-05	10	140	4516	3600					7	268	8645	15000										300	25.5	17.756	573	1100																																						
Sep-05	15	95	3167	3600					44	306	10200	15000										300	35.5	18.208	607	1100																																						
Oct-05	9	143	4613	3600					14	281	9065	15000										300	7.0	20.063	647	1100																																						
Nov-05	75	180	6000	3600					66	292	9733	15000										300				1100																																						
Dec-05	13	174	5613	3600					13	285	9194	15000										300				1100																																						
Jan-06	100	194	6258	3600					53	293	9452	15000										300	45.0	30.515	984	1100																																						
Feb-06	49	174	6214	3600					21	237	8464	15000										300	54.0	21.813	779	1100																																						
Mar-06	40	169	5452	3600					57	261	8419	15000										300	41.0	25.096	810	1100																																						
Apr-06	122	212	7067	3600					75	290	9667	15000										300	64.5	24.224	807	1100																																						
May-06	113	244	7871	3600					86	327	10548	15000										300	121.0	19.180	619	1100																																						
Jun-06	7	146	4867	3600					28	314	10467	15000										300	38.0	17.186	573	1100																																						
Jul-06	42.5	160	5161	3600					45.5	317	10226	15000										300		19.637	633	1100																																						
Aug-06	302.5	312	10065	3600					339	347	11194	15000										300		33.485	1080	1100																																						
Sep-06	26	159	5300	3600					21	242	8067	15000										300		24.162	805	1100																																						
Oct-06	87	182	5871	3600					52	255	8226	15000										300		23.959	773	1100																																						
Nov-06	25	171	5700	3600					33	248	8267	15000										300		30.635	1021	1100																																						
Dec-06	48	161	5323	3600					53	270	8710	15000										300		33.615	1084	1100																																						
Jan-07	33	167	5387	3600					41	270	8710	15000										300	37	5.007	162	300																																						
Feb-07	35	149	5321	3600					36	252	9000	15000										300	35.5			300																																						
Mar-07	143	210	6774	3600					85	289	9323	15000										300	114			300																																						
Apr-07	61.5	144	4800	3600					39	269	8967	15000										300	50.3			300																																						
May-07	113	197	6355	3600					103	314	10129	15000										300	108			300																																						
Jun-07	61	117	3900	3600					2	261	8700	15000										300	31.5			300																																						
Jul-07	92.5	92	2968	3600					42	264	8516	15000										300	67.3			300																																						
Aug-07	14	116	3742	3600					16	264	8516	15000										300	15	3.769	122	300																																						
Sep-07	15	139	4633	3600					13	258	8600	15000										300	14	3.422	114	300																																						
Oct-07	48.5	146	4710	3600					55.5	267	8613	15000										300	52	3.365	109	300																																						
Nov-07	331.5	494	16467	3600					294	348	11600	15000										300	312.8			300																																						
Dec-07	134.5	332	10710	3600					104	391	12613	15000										300	119.3	23.054	744	300																																						
Jan-08	89	196	6323	3600					74	377	12161	15000										300	81.5			300																																						
Feb-08	25.5	152	5241	3600					67	354	12207	15000										300	46.3			300																																						
Mar-08	33	152	4903	3600					35	313	10097	15000										300	34			300																																						
Apr-08	0	119	3967	3600					34	290	9667	15000										300	17			300																																						
May-08	5	134	4323	3600					9	332	10710	15000										300	7			300																																						
Jun-08	77	195	6500	3600					79	362	12067	15000										300	78			300																																						
Jul-08	25	175	5645	3600					17	334	10774	15000										300	21	3.226	104	300																																						
Aug-08	78	193	6226	3600					48	381	12290	15000										300	63	4.700	152	300																																						
Sep-08	30	178	5933	3600					20	351	11700	15000										300	25	3.963	132	300																																						
Oct-08	35	181	5839	3600					38	323	10419	15000										300	37	3.612	117	300																																						
Nov-08	180.5	345	11500	3600					147	435	14500	15000										300	164	4.568	152	300																																						
Dec-08	0	233	7516	3600					5.5	371	11968	15000										300	3	5.799	187	300																																						
Jan-09	0	213	6871	3600					6	356	11484	15000										300	3	4.070	131	300																																						
Feb-09	66	213	7607	3600					56	350	12500	15000										300	61	3.676	131	300																																						
Mar-09	18	208	6710	3600					24	389	12548	15000										300	21	3.661	118	300																																						
Apr-09	31	186	6200	3600					39	385	12833	15000										300	35	4.762	159	300																																						
May-09	4.2	187	6032	3600					7	339	10935	15000										300	6	3.633	117	300																																						
Jun-09	74.5	186	6200	3600					64	371	12367	15000										300	69	3.518	117	300																																						
Jul-09	65.5	205	6613	3600					54	377	12161	15000										300	60	3.669	118	300																																						
Aug-09	12	192	6194	3600					14	365	11774	15000										300	13	3.971	128	300																																						
Sep-09	73	211	7033	3600					59	358	11933	15000										300	66	4.153	138	300																																						
Oct-09	16	212	6839	3600					50	365	11774	15000										300	33	3.772	122	300																																						
Nov-09	16	191	6367	3600					42	317	10567	15000										300	29	3.189	106	300																																						
Dec-09	67	182	5871	3600					46	329	10613	15000										300	57	5.919	191	300																																						
Jan-10	17	165	5323	3600	3420	641	3412		27	307	9903	15000	15000	672	6655							300	22	3.592	116	300					11.5	16.044	518	1100	971	391	202																																		
Feb-10	83	173	6179	3600	3420	659	4072		92	326	11643	15000	15000	979	11398							300	87.5	3.388	121	300					56.5	11.3	404	1100	971	669	270																																	
Mar-10	16	162	5226	3600	3420	309	1615		13	342	11032	15000	15000	766	8451							300	14.5	4.864	157	300					7	11.8	381	1100	971	390	148																																	
Apr-10	37	119	3967	3600	3420	539	2138		35	301	10033	15000	15000	786	7886							300	36	3.659	122	300					29.5	12	400	1100	971	440	176																																	
May-10	9	120	3871	3600	3420	349	1351		10	275	8871	15000	15000	782	6937							300	9.5	2.693	87	300					3	10.9	352	1100	971	400	141																																	
Jun-10	92.5	139	4633	3600	3420	454	2104		127	346	11533	15000	15000	715	8246							300	109.8	3.643	121	300					89.5	11.3	377	1100	971	393	148																																	
Jul-10	98	166	5355	3600	3420	516	2763		108.5	370	11935	15000	15000	1132	13511							300	103.3	3.860	125	300					78.5	12.7	410	1100	971	520	213																																	
Aug-10	0	161	5194	3600	3420	480	2493	0.765	50	347	11194	15000	15000	970	10858							300	25	3.036	98	300					30	12	387	1100	971	456	177																																	
Sep-10	8.5	106	3533	3600	3420	668	2360	0.542	12	246	8200	15000	15000	1595	13079							300	10.3	2.710	90	300					6	11.5	383	1100	971	604	232																																	
Oct-10	127	169	5452	3600	3420	807	4399	0.762	138	275	8871	15000	15000	1506	13360							300	132.5	4.506	145	300					63	12.5	403	1100	971	548	221																																	
Nov-10	51	131	4367	3600	3420	696	3039	0.740	0	260	8667	15000	15000	3326	28825							300	25.5	3.118	104	300					24	12.9	430	1100	971	572	246																																	
Dec-10	131	199	6419	3600	3420	565	3627	0.122	121	215	6935	15000	15000	1208	8378							300	126	12.084	390	300					62.5	18.5	597	1100	971	609	363																																	
Jan-11	59.5	197	6355	3600	3420	573	3641	0.

Rainfall and WWTWs flows

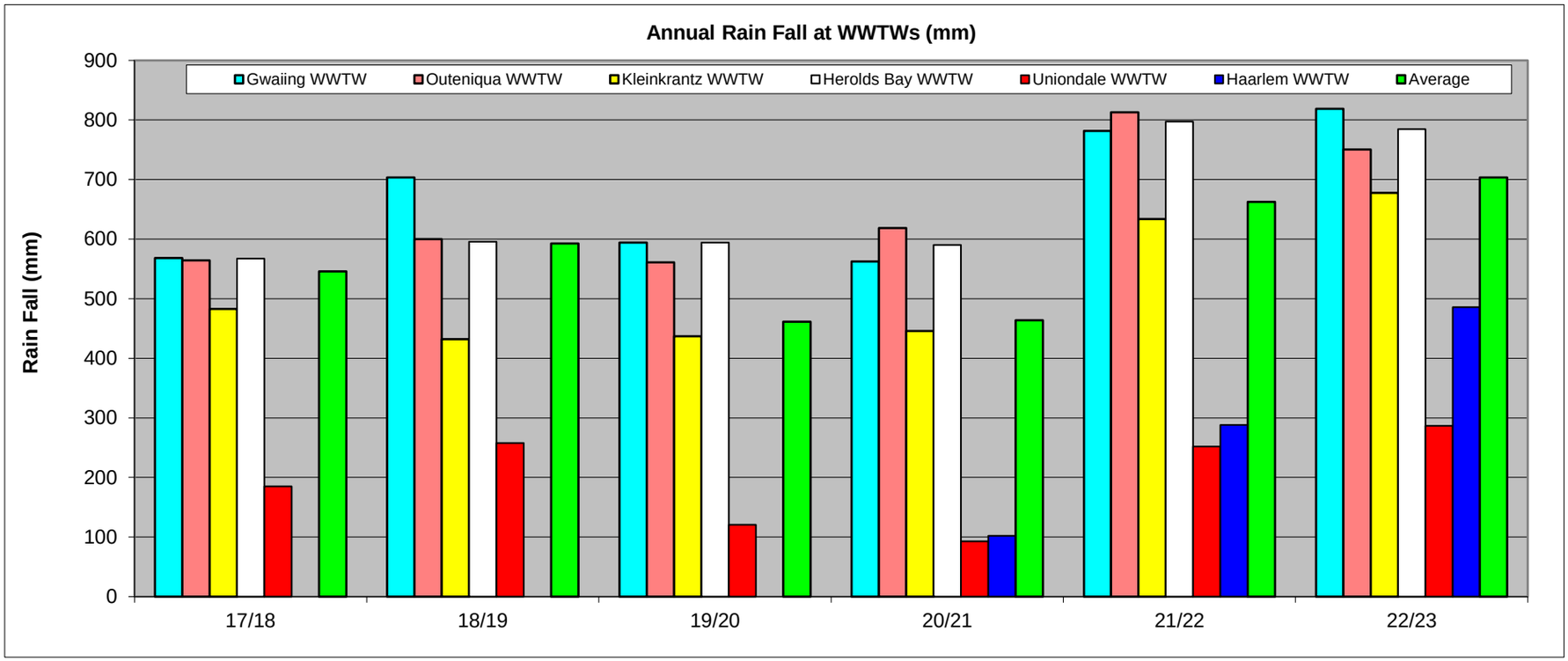
Date	Gwaing WWTW								Outeniqua WWTW										Herold's Bay WWTW								Kleinkrantz WWTW								Uniondale	% of Billed Metered Consumption	60%						Haarlem	% of Billed Metered Consumption	35%						Total WWTWs			
	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Recycled Water	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Discharge to River	Re-use on Site	Pumped to GRD	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Capacity
	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d		mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	ML	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	
Oct-11	42	155	5000	3600	3420	676	3380	0.116	44	229	7387	15000	15000	955	7055	132	4258	0.128	0.000	43	4.794	155	300	210	232	36	43	14.6	471	1100	971	762	359	12741	7.64	247	250	200	1001	247	5306	1.9	60	100	59	325	19	43	413	13319	20350
Nov-11	0	182	6067	3600	3420	578	3507	0.136	123	253	8433	15000	15000	1182	9968	168	5600	0.117	0.000	61.5	3.884	129	300	210	197	31	61.5	19.4	580	1100	971	693	402	15651	9.39	313	250	200	1272	398	5461	1.9	64	100	59	581	37	115	468	15586	20350
Dec-11	35	212	6839	3600	3420	390	2667	0.000	32	248	8000	15000	15000	842	6736	240	7742	0.015	0.000	33.5	4.127	294	300	210	480	141	34.8	24	774	1100	971	477	369	16518	9.91	320	250	200	230	74	8879	3.1	100	100	59	218	22	34	506	16327	20350
Jan-12	35	198	6387	3600	3420	488	3117	0.047	28	234	7548	15000	15000	606	4574	183	5903	0.130	0.000	31.5	5.534	179	300	210	105	19	30	19.1	616	1100	971	402	248	20045	12.03	388	250	200			6615	2.3	75	100	59			31	471	15193	20350
Feb-12	41	196	6759	3600	3420	517	3494	0.124	32	206	7103	15000	15000	1384	9831	223	7690	0.086	0.000	36.5	3.366	116	300	210	796	92	23	15.897	548	1100	971	784	430	18929	11.36	392	250	200	1230	482	5665	2.0	68	100	59	132	9	33	435	14986	20350
Mar-12	73	198	6387	3600	3420	1149	7339	0.161	85	219	7065	15000	15000	786	5553	285	9194	0.054	0.000	79	4.049	131	300	210	228	38	58	17.257	557	1100	971	323	180	19611	11.17	360	250	200	300	108	10769	3.8	122	100	59	148	18	74	453	14621	20350
Apr-12	74	181	6033	3600	3420	1520	9171	0.000	28	215	7167	15000	15000	1170	8385	162	5400	0.138	0.000	51	3.998	133	300	210	297	40	38	17.091	570	1100	971	497	283	17711	10.63	354	250	200			4873	1.7	57	100	59	343	20	48	429	14314	20350
May-12	9.5	125	4032	3600	3420	334	1347	0.002	16	205	6613	15000	15000	757	5006	154	4968	0.090	0.000	12.8	2.181	70	300	210	346	24	11	16.31	526	1100	971	784	430	13401	8.04	259	250	200			4934	1.7	56	100	59	362	20	12	358	11557	20350
Jun-12	95.5	183	6100	3600	3420	636	3880	0.055	92	233	7767	15000	15000	831	6454	175	5833	0.018	1.114	93.8	2.573	86	300	210	189	16	86	16.6	553	1100	971	784	430	13949	8.37	279	250	200	525	146	5572	2.0	65	100	59	380	25	92	445	14850	20350
Jul-12	149.7	267	8613	3600	3420	362	3118	0.018	165	317	10226	15000	15000	586	5992	238	7677	0.010	0.000	157.4	4.176	135	300	210	217	29	142	16.8	542	1100	971	318	172	11657	6.99	226	250	200			6309	2.2	71	100	59			154	614	19812	20350
Aug-12	114	272	8774	3600	3420			0.018	124	349	11258	15000	15000	1252	9964	10853	232	7484	0.000	0.000	119	5.490	177	300	210	139	25	47	17	548	1100	971	508	279	12843	7.71	249	250	200			7126	2.5	80	100	59	153	12	101	654	21087	20350
Sep-12	16	167	5567	3600	3420	488	2718	0.031	16.5	189	6300	15000	15000	1169	7362	106	3533	0.028	0.000	16.3	3.486	116	300	210	168	19	6	15.3	510	1100	971	387	197	12908	7.74	258	250	200	265	68	7377	2.6	86	100	59	143	12	14	385	12837	20350
Oct-12	171	305	9839	3600	3420	1055	10382	0.009	136	336	10839	15000	15000	1211	13120	224	7226	0.012	6.685	153.5	4.390	142	300	210	254	36	106	19.4	626	1100	971	424	265	13898	8.34	269	250	200	305	82	7022	2.5	79	100	59	277	22	142	676	21793	20350
Nov-12	44	211	7033	3600	3420	623	4373	0.016	38	345	11500	15000	15000	1252	14392	231	7700	0.022	0.000	41	3.699	123	300	210	233	29	22	17.5	583	1100	971	394	230	12365	7.42	247	250	200			7056	2.5	82	100	59			36	587	19570	20350
Dec-12	12	193	6226	3600	3420	717	4465	0.000	16	409	13194	15000	15000	1108	14615	307	9903	0.005	0.000	14	7.844	253	300	210	305	77	35	23.4	755	1100	971	255	192	17841	10.70	345	250	200	208	72	9688	3.4	109	100	59	425	46	19	647	20882	20350
Jan-13	96	237	7645	3600	3420	373	2848	0.000	92	425	13710	15000	15000	968	12368	284	9161			94	5.998	193	300	210	246	48	56	20.9	674	1100	971	460	310	15896	9.54	308	250	200	1081	333	9365	3.3	106	100	59	2771	293	85	702	22636	20350
Feb-13	7	231	8250	3600	3420	1117	9215	0.748	69	395	14107	15000	15000	1035	14601	263	9393			38	3.423	122	300	210	305	37	43	16.9	604	1100	971	860	519	14280	8.57	306	250	200	647	198	8333	2.9	104	100	59	378	39	39	658	23493	20350
Mar-13	18	165	5323	3600	3420	650	3460	15.109	30	403	13000	15000	15000	1241	16133	269	8677			24	4.157	134	300	210	305	41	35	18.1	584	1100	971	619	361	14756	8.85	286	250	200	335	96	8809	3.1	99	100	59	307	31	27	602	19426	20350
Apr-13	31	119	3967	3600	3420	292	1158	89.274	2	370	12333	15000	15000	1256	15491	247	8283			16.5	3.507	117	300	210	160	19	39	16.8	560	1100	971	384	215	15203	9.12	304	250	200	351	107	8941	3.1	104	100	59	471	49	22	522	17385	20350
May-13	23	139	4484	3600	3420	690	3094	71.228	37	412	13290	15000	15000	935	12426	274	8839			30	3.243	105	300	210	316	33	33	15.8	510	1100	971	507	278	12461	7.48	241	250	200	342	82	7168	2.5	81	100	59	264	21	31	580	18711	20350
Jun-13	41.5	178	5933	3600	3420	515	3056	52.995	40	391	13033	15000	15000	1031	13437	261	8700			40.8	2.882	96	300	210	397	38	42	15.3	510	1100	971	481	245	13699	8.22	274	250	200	449	123	8832	3.1	103	100	59	369	38	41	598	19950	20350
Jul-13	27	183	5903	7300	6935	296	1747	94.042	54.5	414	13355	15000	15000	819	11357	278	9267			40.8	3.212	104	300	210	336	35	30	15.9	513	1100	971	478	245	11168	6.70	216	250	200	336	73	7031	2.5	79	100	59	370	29	38	625	20170	24050
Aug-13	93	165	5323	7300	6935	280	1490	124.916	87	445	14355	15000	15000	1044	9443	6359	297	9581		89	4.058	131	300	210	231	30	85	17.3	558	1100	971	334	186	12868	7.72	249	250	200	339	84	7903	2.8	89	100	59	418	37	89	642	20705	24050
Sep-13	6	155	5167	7300	6935	500	2583	98.773	7	390	13000	15000	15000	570	7410	260	8667			6.5	3.342	111	300	210	347	39	0	15.9	530	1100	971	338	179	11328	6.80	227	250	200	1388	314	6555	2.3	76	100	59	682	52	5	573	19111	24050
Oct-13	142	279	9000	7300	6935	332	2988	28.331	168	542	17484	15000	15000	1050	18358	361	11645			155	4.739	153	300	210	287	44	164	19.1	616	1100	971	537	208								7126	2.5	80	100	59	644	52	157	851	27463	24050
Nov-13	29	278	9267	7300	6935	274	2539		102	530	17667	15000	15000	1042	14552	455	7985	353	11767	65.5	3.950	132	300	210	467	61	57	15	500	1100	971	513	257								7133	2.5	83	100	59			0	63	832	27742	24800
Dec-13	46	251	8097	7300	6935	238	1927		26	458	14774	15000	15000	498	7358	305	9839			36	8.675	280	300	210	240	67	14	25	806	1100	971	205	165								2.87	93	1000	640	312	29	6792	2.4	77	100	59	301	23	31	748	24127	24800
Jan-14	162	269	8677	7300	6935	287	2490		160	526	16968	15000	15000	592	10045	351	11323			156.3	6.654	215	300	210	322	69	109	25	806	1100	971	274	221	18	351	2.78	90	1000	640	722	65	6695	2.3	76	100	59	294	22	147	832	26831	24800
Feb-14	43	244	8714	7300	6935	301	2623		47	387	13821	15000	15000	792	10947	252	9000			45	3.599	129	300	210	365	47	26	18.1	646	1100	971	343	222	17		2.90	1000	640	707	49	11450	4.0	143	100	59	172	25	40	659	23523	24800
Mar-14	48	275	8871	7300	6935	140	1242		37	416	13419	15000	15000	589	7904	277	8935			42.3	3.860	125	300	210	191	24	47	15.2	490	1100	971	366	179	5		2.40	77	1000	640	419	32	7231	2.5	82	100	59	220	18	44	715	23064	24800
Apr-14	77	251	8367	7300	6935	277	2318		136	416	13867	15000	15000	819	11357	278	9267			106.5	5.203	173	300	210	250	43	52	21.2	707	1100	971	249	176	12.5		2.77	92	1000	640	515	48	6881	2.4	80	100	59	432	35	118	699	23286	24800
May-14	53	329	10613	7300	6935	207	2197		43	482	15548	15000	15000	530	8241	321	10355			48	5.728	185	300	210	122	21	87	16.4	529	1100	971	217	115	16		3.25	105	1000	640	304	32	6015	2.1	68	100	59	555	38	58	838	27048	24800
Jun-14	19	282	9400	7300	6935	199	1871		25	417	13900	15000	15000	658	9146	278	9267			22	3.632	121	300	210	259	31	34	15	500	1100	971	195	98	43		2.75	92	1000	640	283	26	5848	2.0	68	100	59	492	34	25	722	24081	24800
Jul-14	10	235	7581	7300	6935	341	2585	21.5	382	12323	15000	15000	15000	699	8613	255	8215			15.8	3.124	101	300	210	171	17	11	18.2	587	1100	971	378	222	12		2.837	92	1000	640	886	81	4418	1.5	50	100	59	602	30	15	643	20732	24800
Aug-14	19.5	302	9748	7300	6935	479	3121	20.5	366	13186	15000	15000	15000	844	9965	244	7871			20	3.185	103	300	210	212	22	17	14	548	1100	971	437	240	20		2.745	89	1000	640	610	54	5167	1.8	58	100	59	434	25	19	593	19121	24800
Sep-14	26.5	220	7333	7300	6935	649	4759		25	378	12600	15000	15000	971	12235	252	8400			25.8	3.142	105	300	210	304	32	25	17.7	590	1100	971	466	275	8		10.705	357	1000	640	1153	411	7634	2.7	89	100	59	582	52	26	632	21074	24800
Oct-14	33	257	8290	7300	6935	158	1310	33	421	13581	15000	15000	15000	776	10539	281	9054			33	3.100	100	300	210	217	22	56	19.6	632	1100	971	506	320	8.6		17.185	554	1000	640	821	455	6917	2.4	78	100	59	415	32	39	720	23236	24800
Nov-14	59	251	8367	7300	6935	269	2251	88	88	445	14433	15000	15000	1186	10597	185	6156			73.5	3.150	105	300	210	239	25	68	21.1	703	1100	971	297	209	64		10.255	342	1000	640	529	318	7181	2.5	84	100	59	930	78	72	733	24434	24800
Dec-14	59.8	271	8742	7300	6935	284	2483	122.5	481	15516	15000	15000	15000	820	12723	321	10344			91.2	11.195	361	300	210	283	102	46	29.1	939	1100	971	382	359	7.5		12.693	409	1000	640	904	370	7716	2.7	87	100	59	330	29	80	808	26054	24800
Jan-15	41.3	249	8032	7300	6935	523	4201	37.5	394	12710	15000	15000	15000	853	10841	263	8473			39.4	6.789	219	300	210	187	41	41	23.4	755	1100	971	383	289	11		12.958	418	1000	640	758	317	10254	3.6	116	100	59	326	38	40	690	22250	24800
Feb-15	42	237	8393	7300	6935	359	3013	60	281	10036	15000	15000	15000	586	6885	187	6690			51	3.278	135	300	210	262	35	93	7.6	271	1100	971	335	91	17.5		9.310	333	1000	640	639	213	8504	3.0	106	100	59	213	23	62	540	19274	24800
Mar-15	99.3	263	8484	7300	6935	322	2732	61	450	14516	15000	15000	15000	787	11424	300	9677			80.1	4.068	131	300	210	320	42	13	23	74	1100	971	404	30	37		11.534	372	1000	640	962	358	7520	2.6	85	100	59	400	34	63	734	23662	24800
Apr-15	37.1	273	9100	7300	6935	441	4013	39	419	13967	15000	15000	15000	1006	14050	279	9311			38.1	5.667	189	300	210	291	55	69	2	67	1100	971	436	29	23		12.069	402	1000	640	1084	436	6707	2.3	78	100	59	321	25	46	714	23803	24800
May-15	36.3	287	9548	7300	6935	426	2762	51	391	12613	15000	15000	15000	1137	14341	261	8409			43.7	4.068	131	300	210	278	36	12	2.5	81	1100	971	345	258	1.5		12.502	416	1000	640	1034	431	5513	1.9	62	100	59	243	15	36	613	19787	24800
Jun-15	34	275	9167	7300	6935	431	3951	83	529	17633	15000	15000	15000	976	17210	353	11756			58.8	4.899	163	300	210	166	27	112	16.5	550	2500	2208	275	151	112.5		15.38	513	1000	640	901	462	5374	1.9	1	100	59	284	0	72	843	28027	26200
Jul-15	100	270	8710	7300	6935	395	3440	91	499	16097	15000	15000	15000	776	12491	333	10731			95.5	9.179	296	300	210	144	43	76	20.2	652	2500	2208	363	237	29		14.5	468	1000	640	563	263	7471	2.6	84	100	59	287	24	91	815	26306	26200
Aug-15	55	217	7000	7300	6935	411	2877	50	525	16935	15000	15000	15000	1027	12210	350	11290			53.7	3.767	122	300	210	192	23		21.1	681	2500	2208	342	233	28		14.1	455	1000	640	592	269	5862	2.1	66	100	59	316	21	53	783	25259	26200
Sep-15	132.5	224	7467	7300	6935	410	3061	115	550	18333	15000	15000	15000	871	13667	367	12222			123.8	5.645	188	300	210	118	33		21.5	717	2500	2208	406	291	23		16.5	550	1000	640	1042	573	6614	2.3	77	100	59	219	17	124	820	27332	26200
Oct-15	130.2	231	7452	7300	6935	367	2735	100	460	14839	15000	15000	15000	847	12568	307	9892			115.1	5.497	177	300	210	232	41	32	20.9	674	2500	2208	366	247	28		14.5	468	1000	640	713	334	5965	2.1	67	100	59	338	23	94	734	23677	26200
Nov-15	129	222	7400	7300	6935	628	4647	121	404	13467	15000	15000	15000	945	12726	269	8978			125	5.730	191	300	210	247	47	94	21.8	727	2500	2208	396	288	24		15.028	501	1000	640	436	218	6875	2.4	80	100	59	281	23	117	671	22366	26200
Dec-15	37	188	6258	7300	6935	396	2082	31	398	12839	15000	15000	15000	1180	15150	265	8559			34	3.913	126	300	210	275	88	88	28.3	912	2500	2208	499	455	29		12.093	390	1000	640	878	343	8444	3.0	98	100	59	380	37	34	614	19816	26200
Jan-16	94.5	217	7000	7300	6935	474	3318	138	422	13613	15000	15000	15000	1342	18269	281	9054			116.3	7.050	227	300	210	376	86	66	25.4	820	2500	2208	533	437	16		12.842	414	1000	640	1315	545	10726	3.8	121	100	59	210	25	104	688	22195	26200
Feb-16	31.5	188	6483	7300	6935	503	3261	14	424	14621	15000	15000	15000	1278	18685	283	9747			22.8	4.201	145	300	210	240	35	33	25.4	820	2500	2208	677	500	35		11.757	405	1000	640	1104	448	9326	3.3	113	100	59	328	37	25	653	22505	26200
Mar-16	45.6	179	5767	7300	6935	337	2272	19	285	9194	15000	15000	15000	784	7208	190	6129			32.3	5.750	185	300	210	305	57	33	21.4	690	2500	2208	350	241	28		12.827	415	1000	640	644	268	8216	2.9	93	100	59	391	36	32	537	17913	26200
Apr-16	43	160	5333	7300	6935	647	3451	38	349	11633	15000	15000	15000	861	10016	233	7756			40.5	4.197	140	300	210	222	31	40	17.0	568	2500	2208	483	274	18		13.249	442	1000	640	1714	757	7651	2.7	89	100	59	296	26	40	546	18205	26200
May-16	19	128	4129	7300	6935	451	1862	14	348	14452	15000	15000	15000	883	12761	299	9634			16.5	3.855	124	300	210	464	58	3	21.3	687	2500	2208	457	314	13		14.175	457	1000	640	911	417	7236	2.5	82	100	59	285	23	13	618	19931	26200
Jun-16	42	171	5700	7300	6935	822	4685	23	419	13967	15000	15000	15000	916	12793	279	9011			32.5	3.868	129	300	210	296	38	22	17.8	594	2500	2208	510	303	21.5		14.414	481	1000	640	1320	634	7605	2.7	89	100	59	262	23	30	629	20959	26200
Jul-16	47	214	6903	7300	6935	434	2996	29.5	456	14710	15000	15000	15000	835	12283	304	10133			38.3	4.045	130	300	210	367	48	21	17.4	563	2500	2208	561	316	23.5		16.5	532	1000	640	930	495	6645	2.3	75	100	59	304	23	34	710	22913	26200
Aug-16	20	184	5935	7300	6935	483	2867		423	13645	15000	15000	15000	998	13618	282	9097			12	3.804	123	300	210	342	42	16	19.5	629	2500	2208	624	392	32.5		17.93	578	1000	640	845	489	6911	2.4	78	100	59	269	21	16	651	20988	26200
Sep-16	127.5	203	6767	7300	6935	533	2253	106	377	12567	15000	15000	15000	547	6874	251	8108			116.8	5.169	172	300	210	427	74	110	16.9	564	2500	2208	567	403	6.5		16.115	537	1000	640	842	452	8489	3.0	99	100	59	290	29	115	621	20706	26200
Oct-16	18.5	205	6613	7300	6935	444	2936	20	294	9484	15000	15000	15000	863	8185	196	6533			19.3	4.267	138	300	210	238	33	6	23.2	748	2500	2208	414	310	3		16.088	519	1000	640	651	338	8796	3.1	99	100	59	278	26	16	546	17601	26200
Nov-16	13.3	207	6900	7300	6935	447	3084	31	295	9833	15000	15000	15000	1228	12075	197	6344			22.1	3.840	128	300	210	280	36	20	23.2	773	2500	2208	610	471	5.5		13.593	453	1000	640	1075	487	8194	2.9	96	100	59	459	44	22	545	18183	26200
Dec-16	22	198	6387	7300	6935	475	3003	21.6	303	9774	15000	15000	15000	1136	11103	202	6733			21.8	4.298	138	300	210	380	110	5	27.9	899	2500	2208	469	422	0		15.825	510	1000	640	704	359	7905	2.8	89	100	59	256	21	18	564	17884	26200
Jan-17	127	281	9065	7300	6935	386	3499	80	338	10903	15000	15000	15000	1000	10903	275	7269			103.5	6.197	200	300	210	346	69	51	23.4	754	2500	2208	645	486

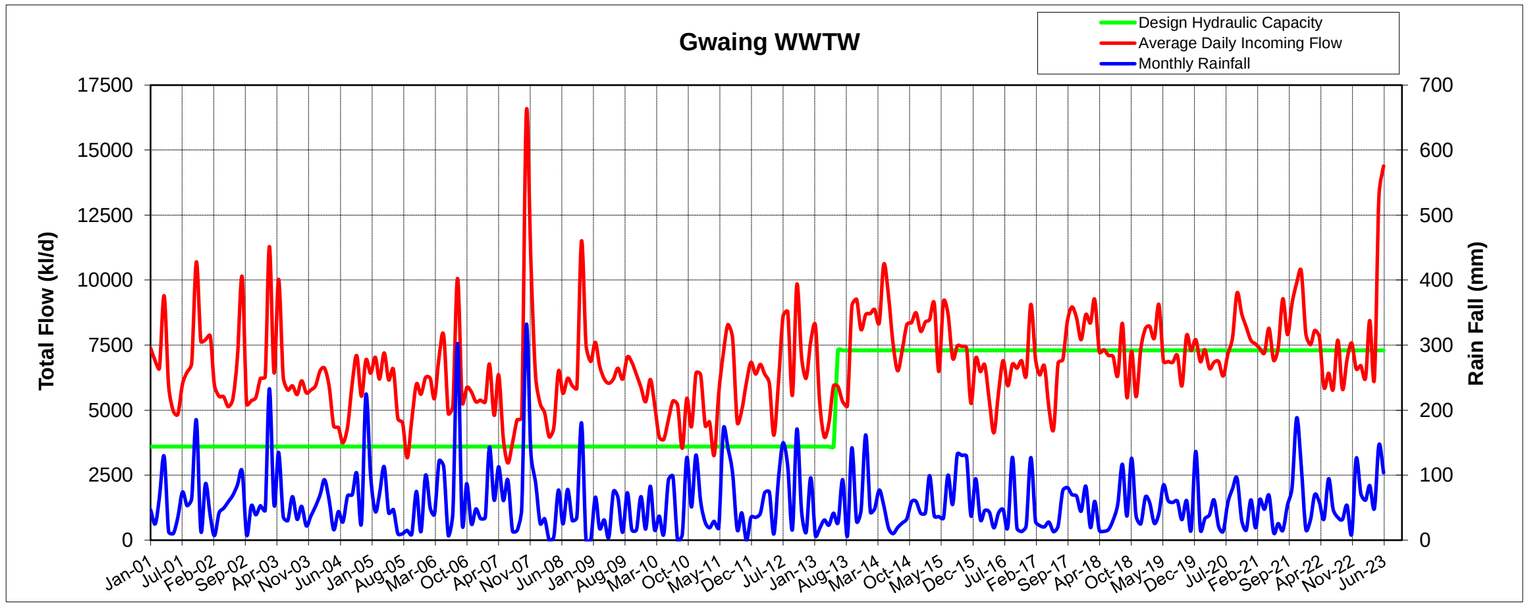
Rainfall and WWTWs flows

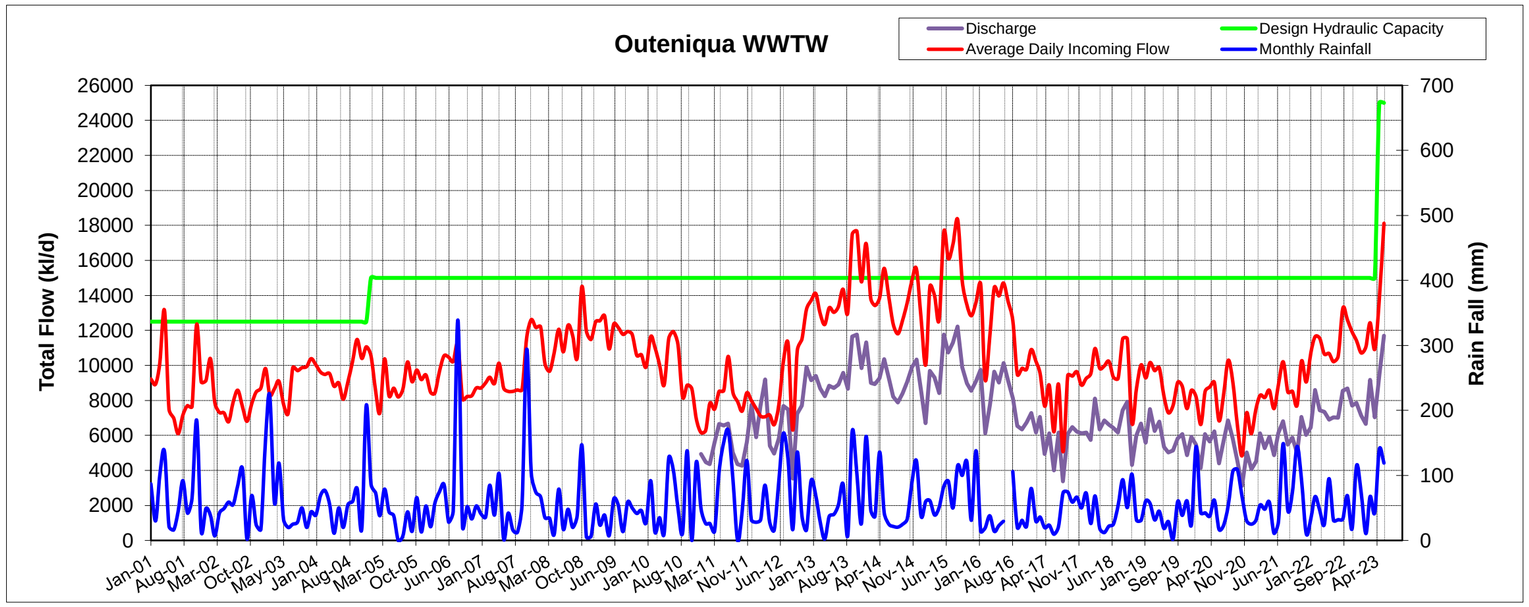
Date	Gwaing WWTW								Outeniqua WWTW										Herold's Bay WWTW								Kleinkrantz WWTW								Uniondale		% of Billed Metered Consumption					60%	Haarlem		% of Billed Metered Consumption					35%	Total WWTWs			
	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Recycled Water	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Discharge to River	Re-use on Site	Pumped to GRD	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Billed Metered Consump	Total Monthly Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Raw Sewerage COD	Actual Organic Load	Monthly Rainfall	Total Monthly Incoming Flow	Average Daily Incoming Flow	Capacity
	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	ML	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d
Jul-20	13.5	196	6311	7300	6935	598	3774		23	257	8290	15000	15000	1048	8688	171	5711		18	3.437	111	300	210	401	44	20	17.4	560	2500	2208	460	258	4		21.393	690	1000	640	572	395	6	6196	2.2	70	100	59	335	23	16	497	16033	26200
Aug-20	57.5	222	7156	7300	6935	426	3048		53.5	319	10290	15000	15000	1209	12441	213	6860		56	3.437	111	300	210	431	48	48	19.5	630	2500	2208	517	326	6		18.371	593	1000	640	595	353	7	6169	2.2	70	100	59	412	29	44	584	18849	26200
Sep-20	79	233	7783	7300	6935	398	3097		106.5	271	9033	15000	15000	702	6341	181	5828		93	5.634	188	300	210	348	65	67	20.4	680	2500	2208	616	419	17		16.84	561	1000	640	567	318	17	5173	1.8	60	100	59	484	29	73	549	18306	26200
Oct-20	95	295	9505	7300	6935	380	3612		109.0	204	6581	15000	15000	1031	6785	136	4533		102	6.345	205	300	210	399	82	30	23.4	755	2500	2208	525	396	13		17.301	558	1000	640	950	530	14	5983	2.1	68	100	59	471	32	70	548	17671	26200
Nov-20	30.5	261	8705	7300	6935	407	3543		67.5	145	4833	15000	15000	1189	5747	97	3118		49	3.246	108	300	210	436	47	40	22.3	742	2500	2208	413	306	7		17.741	591	1000	640	671	397	6	7132	2.5	83	100	59	482	40	39	452	15063	26200
Dec-20	15.5	254	8196	7300	6935	473	3877		30.5	226	7290	15000	15000	1420	10352	151	5022		23	8.190	264	300	210	632	167	11	25.2	813	2500	2208	497	404	8		19.301	623	1000	640	739	460	9	5575	2.0	63	100	59	622	39	18	535	17249	26200
Jan-21	62	238	7684	7300	6935	500	3842		25.0	189	6097	15000	15000	1327	8090	126	4065		44	4.540	146	300	210	400	59	51	22.4	723	2500	2208	948	686	6		18.371	593	1000	640	532	315	8	6564	2.3	74	100	59	460	34	38	475	15317	26200
Feb-21	19	211	7544	7300	6935	378	2852		31.0	210	7500	15000	15000	924	6930	140	4516		25	3.898	139	300	210	450	63	21	17.6	630	2500	2208	577	363	10		20.373	728	1000	640	556	405	12	7001	2.5	88	100	59	402	35	22	466	16629	26200
Mar-21	62.5	278	7367	7300	6935	406	2991		54.5	257	8290	15000	15000	868	7196	171	6119		59	4.934	159	300	210	399	64	67	21.6	698	2500	2208	753	526	4		16.431	530	1000	640	563	298	5	5749	2.0	65	100	59	281	18	50	530	17110	26200
Apr-21	47.5	216	7202	7300	6935	344	2478		48.0	245	8167	15000	15000	953	7783	163	5269		48	4.665	156	300	210	407	63	36	20.4	681	2500	2208	657	447	8		17.674	589	1000	640	692	408	7	5745	2.0	67	100	59	355	24	37	506	16862	26200
May-21	69	253	8149	7300	6935	430	3504		59.0	266	8581	15000	15000	1003	8606	177	5911		64	4.665	150	300	210	397	60	41	20.8	672	2500	2208	479	322	6		18.524	598	1000	640	739	442	4	8539	3.0	96	100	59	322	31	47	566	18247	26200
Jun-21	11.5	207	6912	7300	6935	515	3560		11.0	226	7533	15000	15000	1353	10193	151	4860		11	3.286	110	300	210	388	42	14	14.9	495	2500	2208	575	285	4		16.326	544	1000	640	826	449	6	6009	2.1	70	100	59	220	15	11	470	15665	26200
Jul-21	25.5	229	7392	7300	6935	448	3312		29.5	277	8926	15000	15000	765	6828	184	6149		28	4.195	135	300	210	371	50	23	19.3	622	2500	2208	411	256	4		16.956	547	1000	640	557	305	4	5039	1.8	57	100	59	400	23	22	548	17680	26200
Aug-21	15.1	288	9281	7300	6935	344	3193		149.0	316	10209	15000	15000	896	9147	211	6806		82	1.578	51	300	210	312	16	86.5	19.8	639	2500	2208	565	361	7		16.571	535	1000	640	623	333	7	6177	2.2	70	100	59	263	18	68	644	20784	26200
Sep-21	54.2	237	7903	7300	6935	459	3628		46.0	254	8479	15000	15000	1300	11022	170	5470		50	4.677	156	300	210	428	67	31	19.8	661	2500	2208	538	355	0		16.489	550	1000	640	750	412	0	5834	2.0	68	100	59	318	22	36	534	17816	26200
Oct-21	80.5	282	9101	7300	6935	415	3777		74.0	264	8522	15000	15000	1323	11275	176	5871		77	5.472	177	300	210	312	55	35	25.1	809	2500	2208	543	439	23		14.897	481	1000	640	532	256	23	3268	1.1	37	100	59	357	13	58	593	19126	26200
Nov-21	188	297	9889	7300	6935	446	4411		144.5	231	7715	15000	15000	953	7352	154	4977		166	6.332	211	300	210	302	64	93	23.7	789	2500	2208	540	426	10		18.274	609	1000	640	674	411	10	8355	2.9	97	100	59	434	42	120	579	19310	26200
Dec-21	115	321	10358	7300	6935	201	2082		92.5	318	10254	15000	15000	849	8706	212	7064		104	9.898	319	300	210	233	74	140	29.9	965	2500	2208	434	419	40		18.255	589	1000	640	431	254	40	7267	2.5	82	100	59	343	28	98	700	22567	26200
Jan-22	16.5	246	7929	7300	6935	463	3671		10.5	281	9051	15000	15000	985	8915	187	6034		14	4.186	135	300	210	332	45	9	25.3	816	2500	2208	404	330	18		18.663	602	1000	640	838	505	18	7146	2.5	81	100	59	376	30	14	577	18613	26200
Feb-22	31.75	210	7517	7300	6935	534	4014		34.0	300	10730	15000	15000	1267	13595	200	6461		33	5.636	201	300	210	391	79	48	20.6	735	2500	2208	627	461	30		16.073	574	1000	640	1076	618	30	8136	2.8	102	100	59	313	32	35	556	19859	26200
Mar-22	70	250	8068	7300	6935	462	3727		67.5	361	11643	15000	15000	901	10490	241	8594		69	4.809	155	300	210	299	46	49	24.4	787	2500	2208	649	511	13		19.471	628	1000	640	754	474	30	6105	2.1	69	100	59	269	19	57	662	21350	26200
Apr-22	58	234	7799	7300	6935	468	3650		46.0	346	11539	15000	15000	1115	12866	231	7445		52	4.520	151	300	210	299	45	31	23.2	774	2500	2208	719	557	12		15.703	523	1000	640	571	299	31	6006	2.1	70	100	59	355	25	44	626	20857	26200
May-22	32.5	182	5875	7300	6935	639	3754		24.5	330	10652	15000	15000	1166	12420	220	7338		29	3.364	109	300	210	365	40	36	20.9	675	2500	2208	709	479	60		16.511	533	1000	640	735	391	60	6427	2.2	73	100	59	417	30	36	555	17916	26200
Jun-22	94.5	193	6420	7300	6935	465	2985		95.0	321	10686	15000	15000	1022	10921	214	6894		95	4.135	138	300	210	258	36	52	21.3	709	2500	2208	503	357	35		11.822	394	1000	640	984	388	35	7196	2.5	6	100	59	276	2	74	553	18353	26200
Jul-22	47.5	190	5798	7300	6935	467	2708		31.0	317	10212	15000	15000	791	8078	211	7035		39.3	3.783	122	300	210	271	33	26	19.680	635	2500	2208	561	356	13.0		14.066	454	1000	640	561	255	24	6515	2.3	74	100	59	219	16	34	536	17294	26200
Aug-22	35.0	239	7694	7300	6935	463	3562		32.0	326	10524	15000	15000	819	8619	217	7016		33.5	4.212	136	300	210	244	33	29	22.865	738	2500	2208	565	417	37.0		14.680	474	1000	640	527	250	49	7224	2.5	82	100	59	206	17	36	609	19647	26200
Sep-22	32.0	174	5798	7300	6935	431	2499		33.0	398	13260	15000	15000	592	7850	265	8555		32.5	4.652	155	300	210	396	61	18	18.890	630	2500	2208	465	293	29.5		14.206	474	1000	640	326	154	38	5997	2.1	70	100	59	199	14	31	612	20386	26200
Oct-22	53.5	215	6938	7300	6935	440	3053		69.0	391	12615	15000	15000	1317	16614	261	8690		61.3	3.709	120	300	210	253	30	17	22.279	719	2500	2208	389	280	0.0		10.820	349	1000	640	494	172	0	7274	2.5	82	100	59	205	17	40	645	20822	26200
Nov-22	9.5	227	7579	7300	6935	541	4100		17.5	358	11926	15000	15000	771	9195	239	7694		13.5	4.565	152	300	210	313	48	9	20.752	692	2500	2208	454	314	0.0		21.639	721	1000	640	523	377	0	7843	2.7	92	100	59	261	24	10	635	21162	26200
Dec-22	125.5	204	6586	7300	6935	446	2937		115.0	354	11411	15000	15000	612	6983	236	7861		120.3	4.810	155	300	210	328	51	122	28.261	912	2500	2208	601	548	48.5		21.229	685	1000	640	539	369	52	7445	2.6	84	100	59	225	19	107	615	19832	26200
Jan-23	71.5	208	6710	7300	6935	597	4006		73.0	332	10710	15000	15000	761	8151	221	7140		72.3	8.501	274	300	210	378	104	51.5	25.591	826	2500	2208	505	417	15.0		17.704	571	1000	640	662	378	23	8272	2.9	93	100	59	304	28	59	595	19181	26200
Feb-23	61.5	175	6235	7300	6935	371	2313		10.5	310	11055	15000	15000	864	9552	206	6657		36.0	5.962	142	300	210	352	50	50	19.352	691	2500	2208	579	400	6.5		15.170	542	1000	640	819	444	49	7705	2.7	96	100	59	236	23	41	525	18761	26200
Mar-23	84.0	262	8449	7300	6935	392	3312		67.5	386	12438	15000	15000	789	9814	257	9180		75.8	7.539	243	300	210	268	65	59	23.313	752	2500	2208	543	408	25.5		20.985	677	1000	640	710	481	95	9066	3.2	102	100	59	255	26	76	703	22662	26200
Apr-23	49.0	187	6230	7300	6935	496	3090		43.0	328	10918	15000	15000	746	8145	218	7044		46.0	3.174	106	300	210	337	36	34	27.118	904	2500	2208	718	649	13.0		15.511	517	1000	640	605	313	22	7008	2.5	82	100	59	282	23	39	563	18757	26200
May-23	146.5	410	15229	7300	6935	472	6243		140.0	427	13761	25000	25000	797	10967	284	9480		143.3	4.330	140	300	210	300	42	161	23.919	772	2500	2208	450	347	52.5		15.300	494	1000	640	519	256	71	6953	2.4	79	100	59	222	12	132	583	28470	26200
Jun-23	103.5	432	14392	7300	6935	275	3958		119.0	544	18120	25000	25000	710	12865	362	11690		111.3	6.939	231	300	210	278	64	97	25.686	856	2500	2208	469	402	46.0		14.102	470	1000	640	692	325	63	7645	2.7	89	100	59	321	29	99	1025	34159	36200
Jul-23																																																				

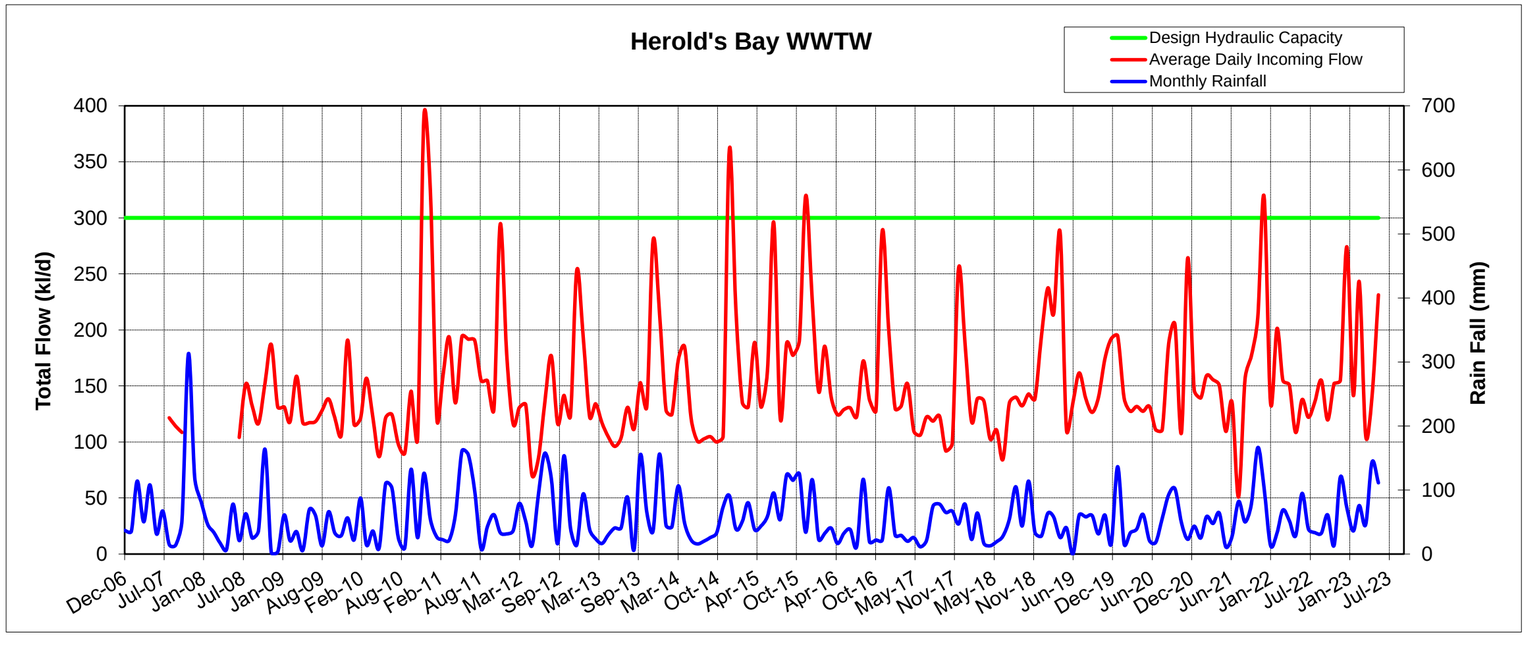
Annual Totals

Year	Gwaing WWTW								Outeniqua WWTW										Herold's Bay WWTW								Kleinkrantz WWTW								Uniondale		% of Billed Metered Consumption					60%	Haarlem		% of Billed Metered Consumption					35%	Total WWTWs			
	Annual Rainfall	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Annual Recycled Water	Annual Rainfall	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Discharge to River		Annual Pumped to GRD	Annual Rainfall	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Annual Rainfall	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Annual Rainfall	Billed Metered Consump	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Annual Rainfall	Billed Metered Consump	Annual Incoming Flow	Average Daily Incoming Flow	Design Hydraulic Capacity	Design Organic Capacity	Average Raw Sewerage COD	Average Organic Load	Annual Rainfall	Annual Incoming Flow	Average Daily Incoming Flow	Capacity
	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	ML	kl/d	ML	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	kl	ML	kl/d	kl/d	kg COD/d	mg/l	kg COD/d	mm	ML	kl/d	kl/d
2001/2002	707	2434	6668						687	2997	8211																																								687	5444	14916	17500
2002/2003	917	2595	7110						949	3026	8290															695	144	395																						854	5765	15795	17500
2003/2004	576	2091	5729						489	3461	9482															509	266	730																						525	5818	15941	17500
2004/2005	935	2225	6096						800	3469	9504															831	264	722																						855	5958	16322	17500
2005/2006	564	2016	5523						464	3408	9337															448	213	584																						519	5637	15444	20000
2006/2007	978	2133	5844						850	3334	9134								376								288	790																						914	5760	15781	20000
2007/2008	866	2267	6211						823	3820	10466								844							656	171	469																						797	6292	17238	20000
2008/2009	542	1986	6844						471	4385	12014								507	498	1365					442	173	473																						491	6105	16466	20000
2009/2010	504	2071	5674	3600	3420	492	2791	568	568	4008	10981	15000	15000	783	8602				536	47	127					389	161	440	1100	971	447	197																						499	6286	17223	20000
2010/2011	740	1882	5156	3600	3420	588	3034		801	3069	8408	15000	15000	1227	10313				770	63	174	300	210	247	43	569	163	446	1100	971	501	223																						720	5177	14184	20000
2011/2012	666	2264	6203	3600	3420	529	3918	0.661	743	2868	7858	15000	15000	894	9703	2216	6071	1.071	1.114	705	56	153	300	210	309	47	808	200	547	1100	971	501	274				114	313	250	200	759	238	0			28	76	207	100	59	292	22	730	5530	15149	20350
2012/2013	723	2484	6805	3600	3420	626	4257	229.446	766	4341	11893	15000	15000	1063	12640	2936	8044	0.077	6.685	745	52	143	300	210	254	36	606	213	584	1100	971	467	273				101	276	250	200	434	120	0			34	92	100	59	556	51	710	7225	19794	20350
2013/2014	745	2961	8112	7300	6935	278	2252	346.062	893	5423	14858	15000	15000	637	9463	3609	9888	0.000	0.000	813	57	155	300	210	284	44	805	219	600	1100	971	321	193	112			47	128	1000	640	560	72	0			30	83	100	59	416	35	814	8737	23937	24050
2014/2015	498	2922	8033	7300	6935	390	3134	0.000	642	4937	13526	15000	15000	846	11445	3291	9017	0.000	0.000	570	56	154	300	210	244	38	563	177	485	1100	971	387	188	323			131	358	1000	640	890	318	0			29	79	100	59	423	34	568	8262	22635	24800
2015/2016	859	2400	6575	7300	6935	487	3201	0.000	754	5183	14200	15000	15000	950	13495	3455	9467	0.000	0.000	808	69	188	300	210	264	50	399	258	707	2500	2208	449	317	264			166	455	1000	640	936	426	0			32	88	100	59	299	26	758	8108	22214	26200
2016/2017	488	2369	6490	7300	6935	482	3126	0.000	406	3760	10301	15000	15000	565	9838	2507	6867	0.000	0.000	449	55	151	300	210	311	47	279	238	652	2500	2208	565	369	184			201	551	1000	640	830	458	0			33	90	100	59	349	31	410	6656	18236	26200
2017/2018	568	2899	7942	7300	6935	672	5335	0.000	565	3377	9252	15000	15000	939	8689	2251	6168	0.000	0.000	567	49	134	300	210	323	43	483	233	639	2500	2208	642	410	185			221	607	1000	640	810	491	0			28	78	100	59	374	29	546	6808	18652	26200
2018/2019	704	2655	7274	7300	6935	540	3930	0.000	600	3480	9534	15000	15000	858	8178	2320	6356	0.000	0.000	596	59	162	300	210	361	58	432	216	592	2500	2208	610	362	258			255	698	1000	640	767	536	0			27	74	100	59	276	20	593	6692	22064	26200
2019/2020	594	2565	7027	7300	6935	526	3693	0.000	561	2959	8107	15000	15000	876	7105	1973	5405	0.000	0.000	594	54	149	300	210	361	54	437	236	647	2500	2208	637	412	121			192	527	1000	640	706	372	0			29	79	100	59	318	25	461	6036	19771	26200
2020/2021	563	2815	7712	7300	6935	438	3377	0.000	693	2815	7712	15000	15000	1086	8372	1877	5142	0.000	0.000	591	56	154	300	210	424	65	446	246	674	2500	2208	585	394	93			219	599	1000	640	667	399	102			27	73	100	59	404	29	464	6177	20300	26200
2021/2022	782	2969	8134	7300	6935	445	3622	0.000	813	3600	9863	15000	15000	1045	10308	2400	6575	0.000	0.000	737	59	161	300	210	325	52	634	273	749	2500	2208	554	414	252			200	547	1000	640	710	389	288			27	74	100	59	343	25	663	7128	23421	26200
2022/2023	819	2912	7978	7300	6935	449	3584	0.000	751	4468	12241	15000	15000	797	9761	2979	8161	0.000	0.000	785	60	165	300	210	310	51	678	278	761	2500	2208	525	399	287			195	535	1000	640	581	311	486			31	85	100	59	250	21	704	7944	26137	26200


Annual Rain Fall at WWTWs (mm)
Rain Fall (mm)
900
800
700
600
500
400
300
200
100
0
Gwaiing WWTW
Outeniqua WWTW
Kleinkrantz WWTW
Herolds Bay WWTW
Uniondale WWTW
Haarlem WWTW
Average
17/18
18/19
19/20
20/21
21/22
22/23


Gwaing WWTW
Design Hydraulic Capacity
Average Daily Incoming Flow
Monthly Rainfall
Total Flow (kl/d)
Rain Fall (mm)
17500
15000
12500
10000
7500
5000
2500
0
700
600
500
400
300
200
100
0
Jan-01
Jul-01
Feb-02
Sep-02
Apr-03
Nov-03
Jun-04
Jan-05
Aug-05
Mar-06
Oct-06
Apr-07
Nov-07
Jun-08
Jan-09
Aug-09
Mar-10
Oct-10
May-11
Dec-11
Jul-12
Jan-13
Aug-13
Mar-14
Oct-14
May-15
Dec-15
Jul-16
Feb-17
Sep-17
Apr-18
Oct-18
May-19
Dec-19
Jul-20
Feb-21
Sep-21
Apr-22
Nov-22
Jun-23


Outeniqua WWTW
Discharge
Design Hydraulic Capacity
Average Daily Incoming Flow
Monthly Rainfall
Total Flow (kl/d)
Rain Fall (mm)
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
700
600
500
400
300
200
100
0
Jan-01
Aug-01
Mar-02
Oct-02
May-03
Jan-04
Aug-04
Mar-05
Oct-05
Jun-06
Jan-07
Aug-07
Mar-08
Oct-08
Jun-09
Jan-10
Aug-10
Mar-11
Nov-11
Jun-12
Jan-13
Aug-13
Apr-14
Nov-14
Jun-15
Jan-16
Aug-16
Apr-17
Nov-17
Jun-18
Jan-19
Sep-19
Apr-20
Nov-20
Jun-21
Jan-22
Sep-22
Apr-23


Herold's Bay WWTW
Design Hydraulic Capacity
Average Daily Incoming Flow
Monthly Rainfall
Total Flow (kl/d)
Rain Fall (mm)
0
50
100
150
200
250
300
350
400
0
100
200
300
400
500
600
700
Dec-06
Jul-07
Jan-08
Jul-08
Jan-09
Aug-09
Feb-10
Aug-10
Feb-11
Aug-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Oct-14
Apr-15
Oct-15
Apr-16
Oct-16
May-17
Nov-17
May-18
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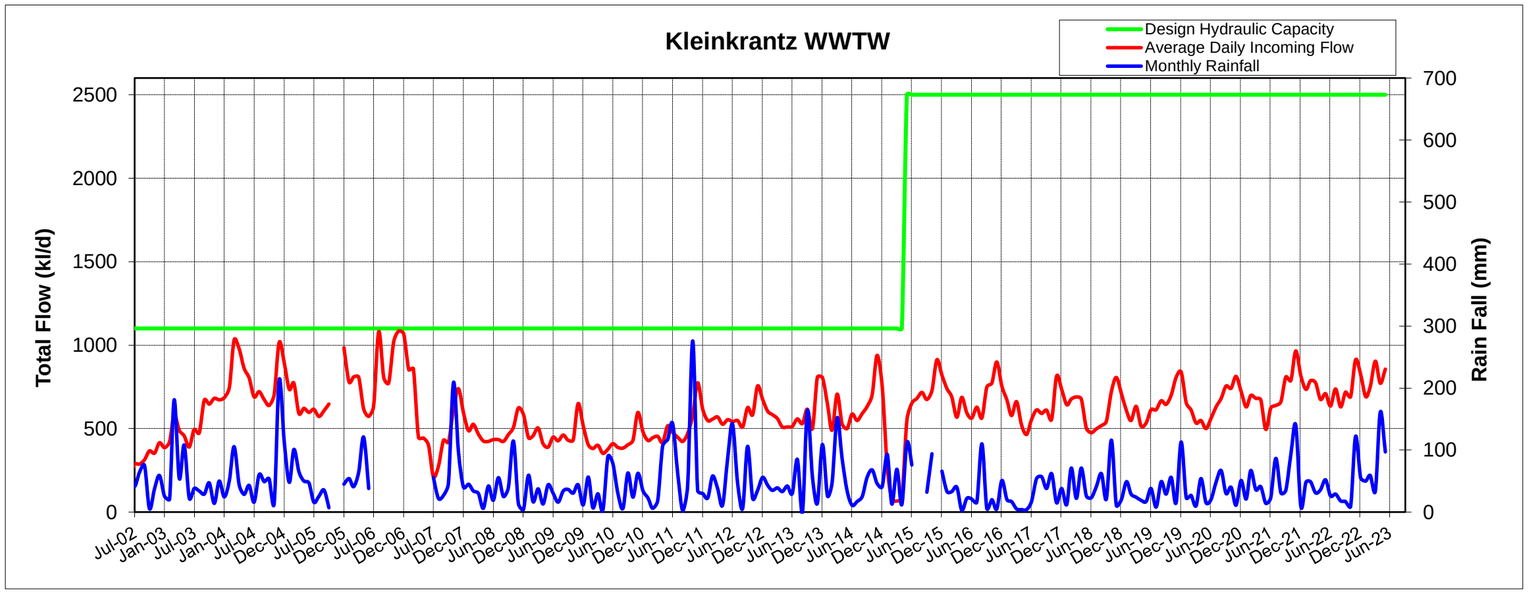
Dec-20
Jun-21
Jan-22
Jul-22
Jan-23
Jul-23


Kleinkrantz WWTW
Design Hydraulic Capacity
Average Daily Incoming Flow
Monthly Rainfall
Total Flow (kl/d)
Rain Fall (mm)
0
500
1000
1500
2000
2500
0
100
200
300
400
500
600
700
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Dec-04
Jul-05
Dec-05
Jul-06
Dec-06
Jul-07
Dec-07
Jun-08
Dec-08
Jun-09
Dec-09
Jun-10
Dec-10
Jun-11
Dec-11
Jun-12
Dec-12
Jun-13
Dec-13
Jun-14
Dec-14
Jun-15
Dec-15
Jun-16
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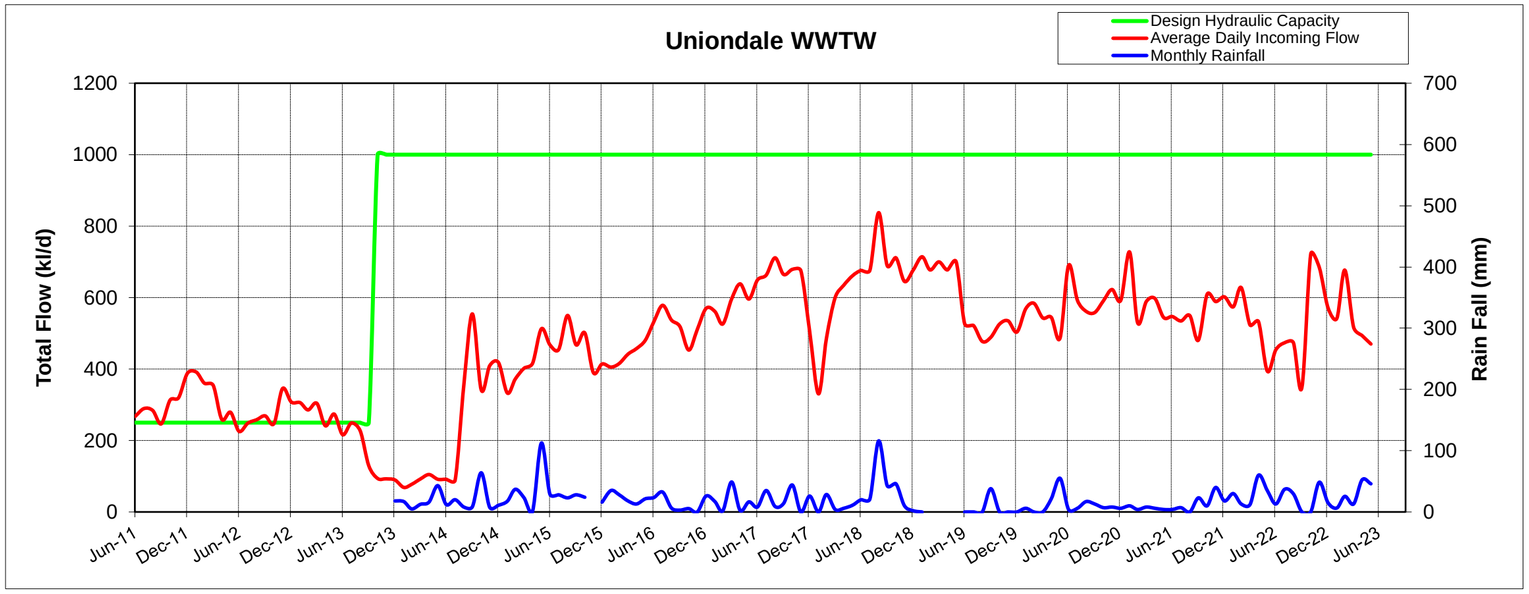
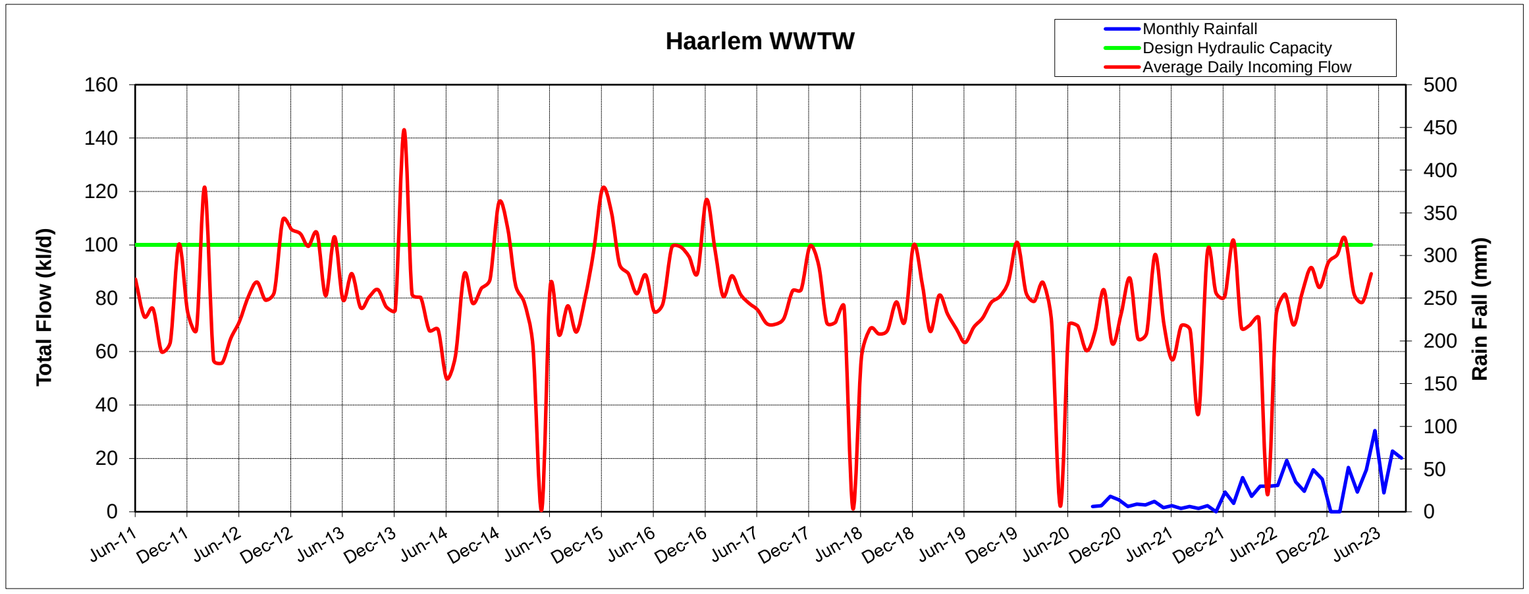
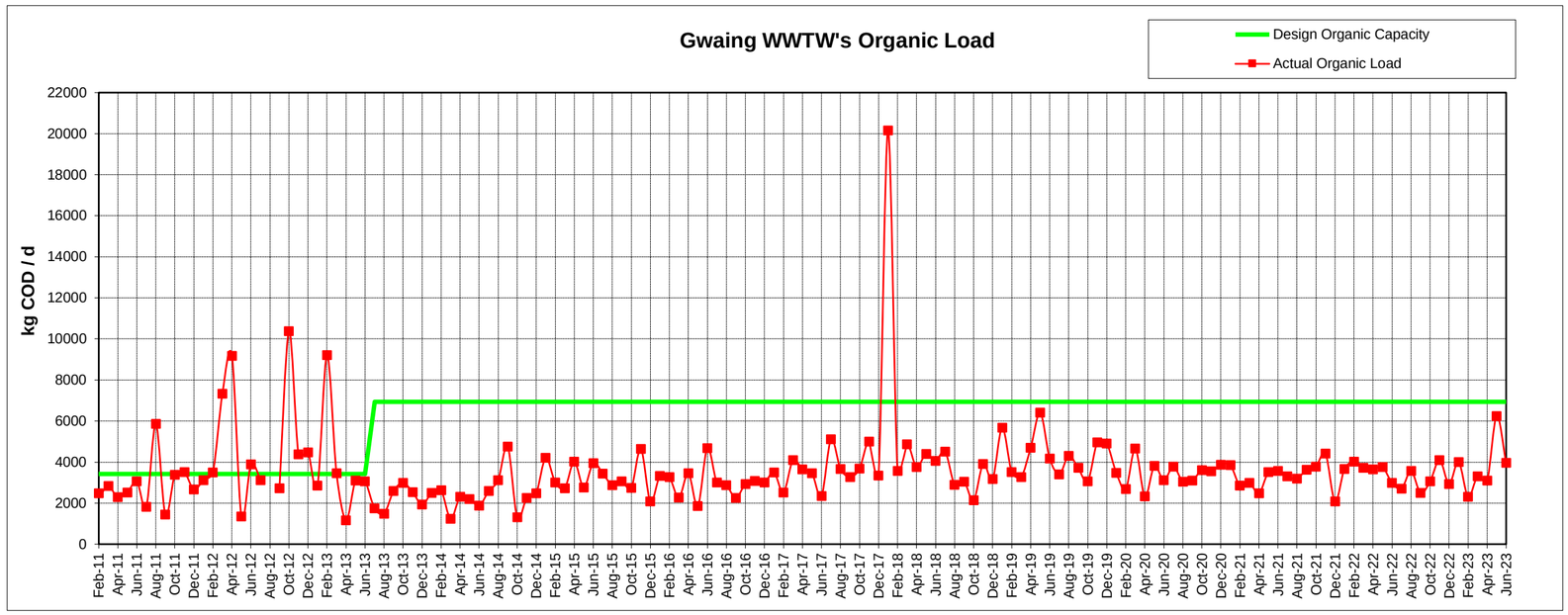
Jun-21
Dec-21
Jun-22
Dec-22
Jun-23


Uniondale WWTW
Design Hydraulic Capacity
Average Daily Incoming Flow
Monthly Rainfall
Total Flow (kl/d)
Rain Fall (mm)
0
200
400
600
800
1000
1200
0
100
200
300
400
500
600
700
Jun-11
Dec-11
Jun-12
Dec-12
Jun-13
Dec-13
Jun-14
Dec-14
Jun-15
Dec-15
Jun-16
Dec-16
Jun-17
Dec-17
Jun-18
Dec-18
Jun-19
Dec-19
Jun-20
Dec-20
Jun-21
Dec-21
Jun-22
Dec-22
Jun-23


Haarlem WWTW
Monthly Rainfall
Design Hydraulic Capacity
Average Daily Incoming Flow
Total Flow (kl/d)
Rain Fall (mm)
0
20
40
60
80
100
120
140
160
0
50
100
150
200
250
300
350
400
450
500
Jun-11
Dec-11
Jun-12
Dec-12
Jun-13
Dec-13
Jun-14
Dec-14
Jun-15
Dec-15
Jun-16
Dec-16
Jun-17
Dec-17
Jun-18
Dec-18
Jun-19
Dec-19
Jun-20
Dec-20
Jun-21
Dec-21
Jun-22
Dec-22
Jun-23


Gwaing WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
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Feb-16
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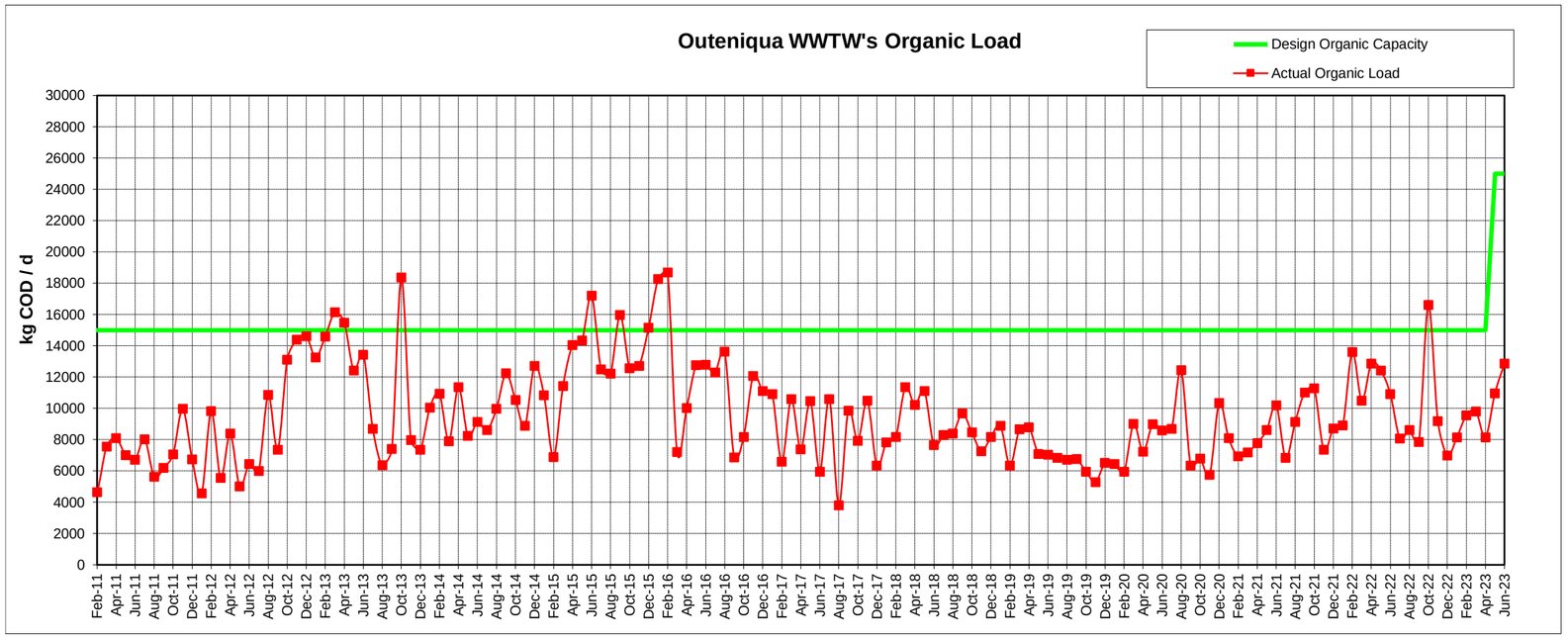
Feb-23
Apr-23
Jun-23


Outeniqua WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
26000
28000
30000
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
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Aug-15
Oct-15
Dec-15
Feb-16
Apr-16
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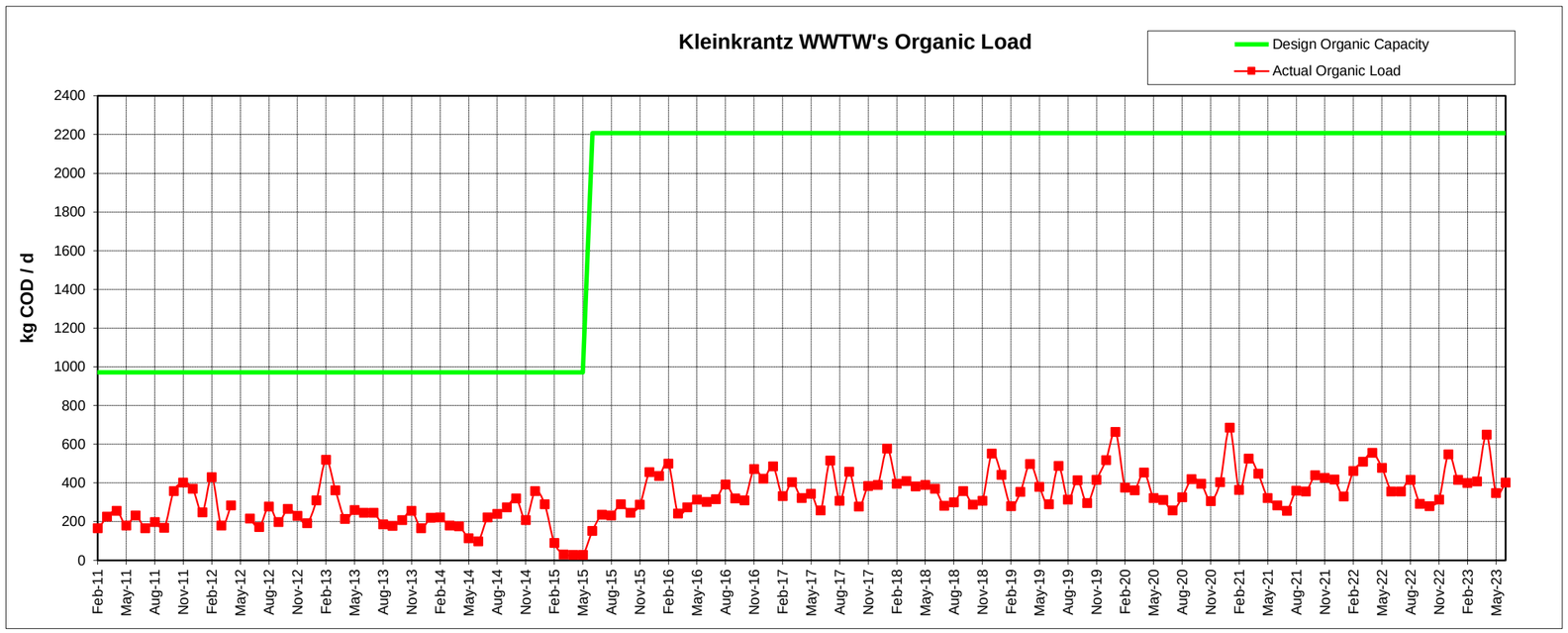
Kleinkrantz WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Feb-11
May-11
Aug-11
Nov-11
Feb-12
May-12
Aug-12
Nov-12
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May-14
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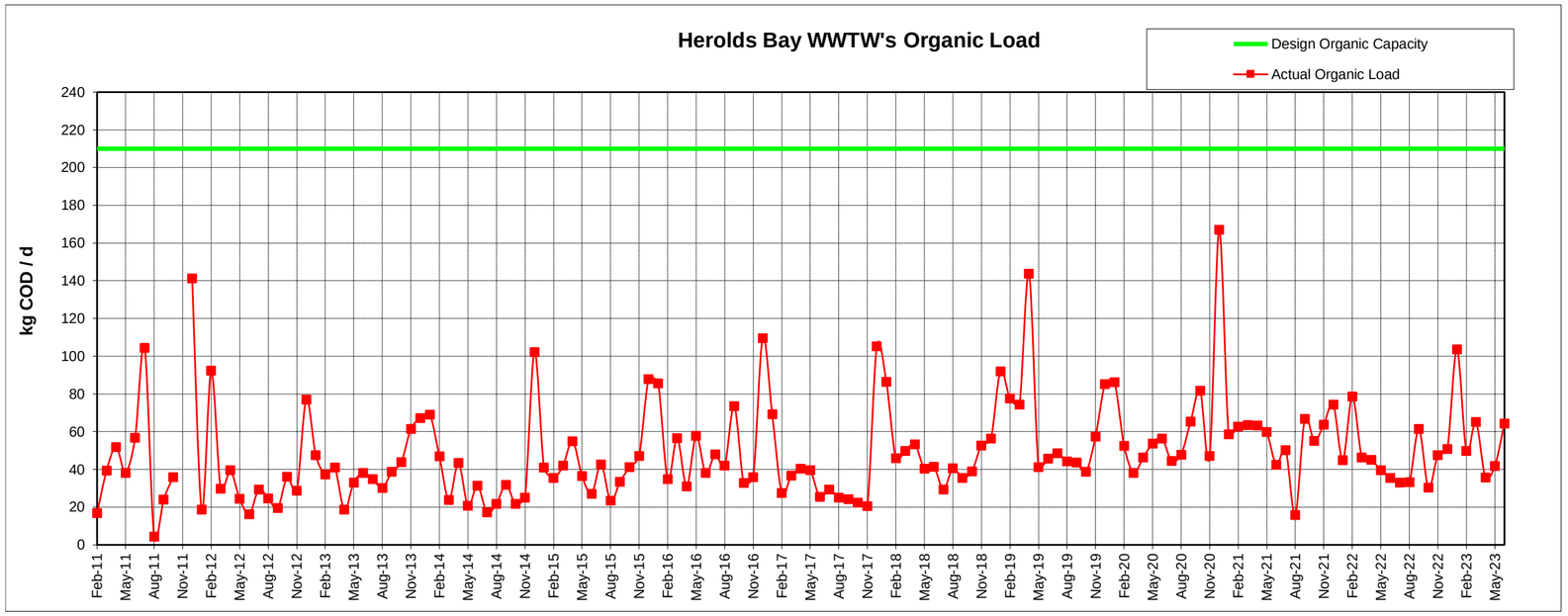
May-23


Herolds Bay WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
240
220
200
180
160
140
120
100
80
60
40
20
0
Feb-11
May-11
Aug-11
Nov-11
Feb-12
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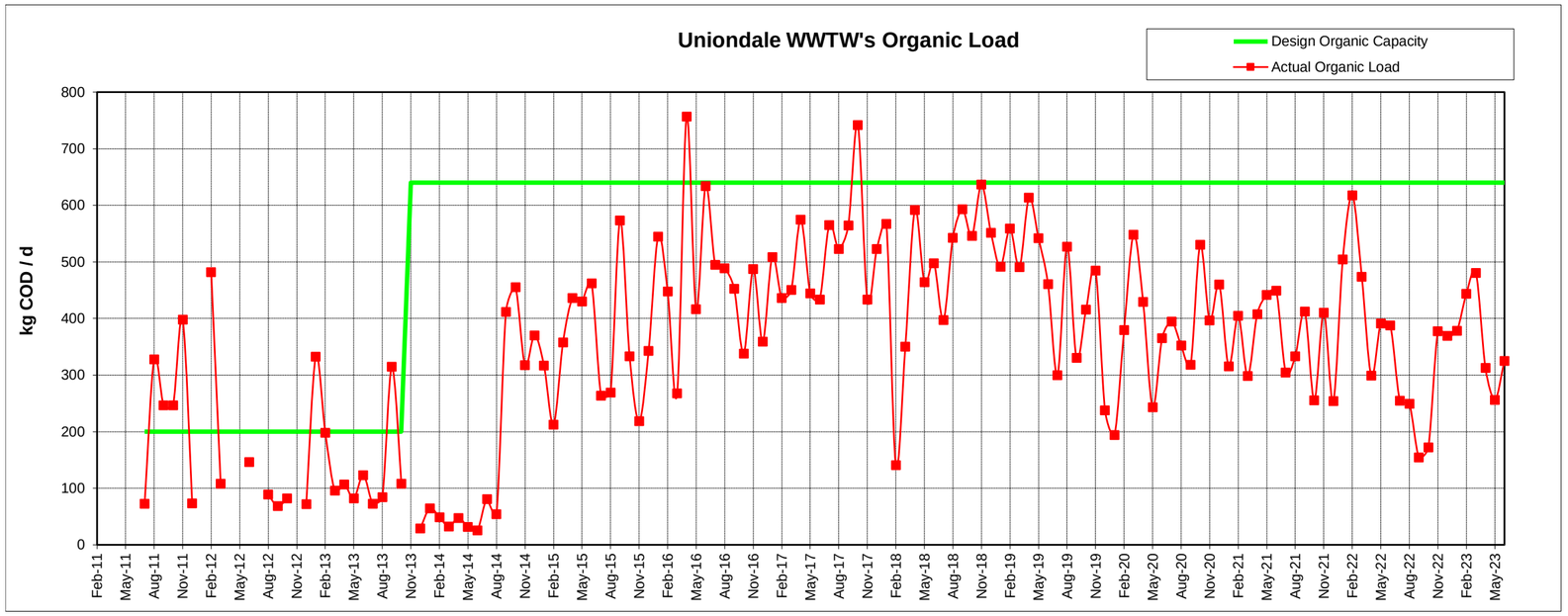
Uniondale WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
0
100
200
300
400
500
600
700
800
Feb-11
May-11
Aug-11
Nov-11
Feb-12
May-12
Aug-12
Nov-12
Feb-13
May-13
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Nov-13
Feb-14
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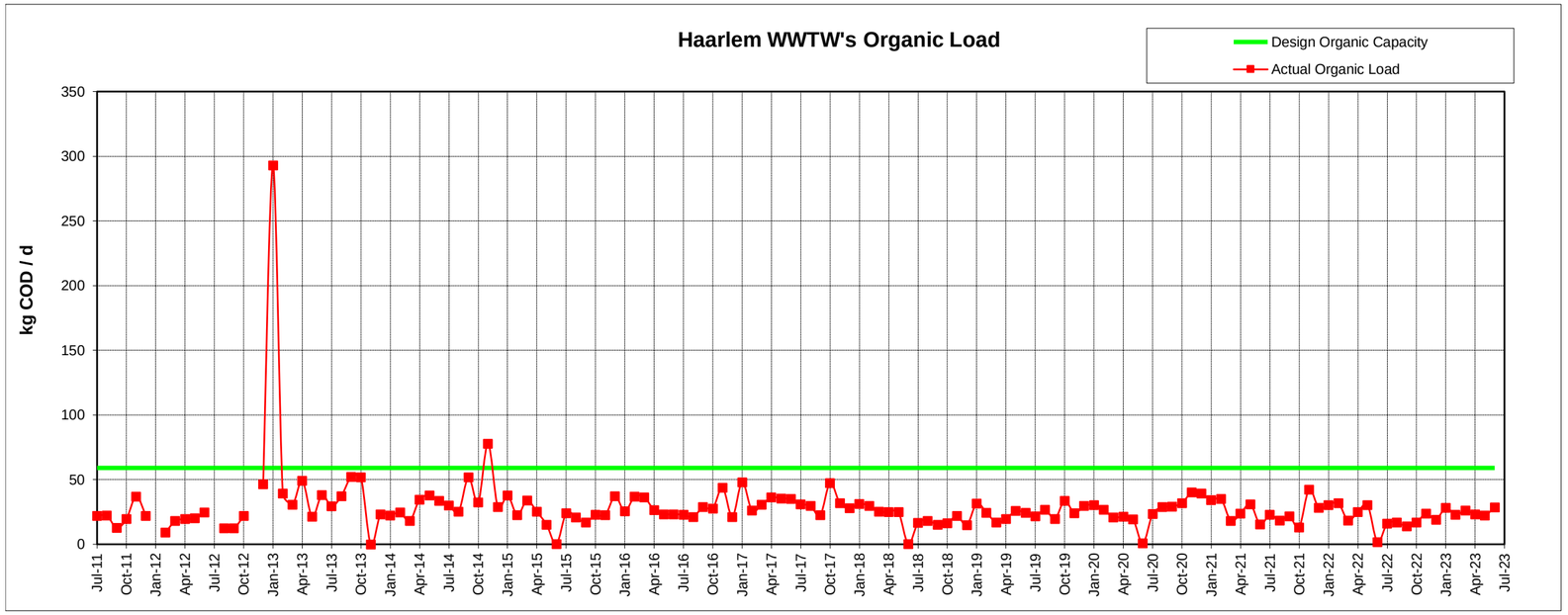
Haarlem WWTW's Organic Load
Design Organic Capacity
Actual Organic Load
kg COD / d
0
50
100
150
200
250
300
350
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
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Jul-23

GEORGE MUNICIPALITY

Uniondale distribution system

Month	Year	BULK WATER SUPPLY						TREATED WATER SUPPLY											
		Raw Water	System Input Volume	Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)								
		Raw Water Supply to WTW	Treated Water after WTW	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered Consumption	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
		[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
Jul'09	09/10																			
Aug'09																				
Sep'09																				
Oct'09																				
Nov'09																				
Dec'09																				
Jan'10																				
Feb'10																				
Mrt'10																				
Apr'10																				
May'10																				
Jun'10																				
Jul'10	10/11								27666											
Aug'10									26754											
Sep'10									31604											
Oct'10									29400											
Nov'10									29400											
Dec'10									36496											
Jan'11									29427											
Feb'11									42610											
Mrt'11									36727											
Apr'11									31587											
May'11									27078											
Jun'11									24815											
Jul'11	11/12	16500	15345	1155	7.00%	18620	8.27%	15345	13818	0	1527	10.0%	15961	7.7%	0	427	1100	7.2%	10796	5.2%
Aug'11		19200	17376	1824	9.50%			17376	14951	0	2425	14.0%			0	431	1994	11.5%		
Sep'11		19325	17392	1933	10.00%			17392	14196	0	3196	18.4%			0	431	2765	15.9%		
Oct'11		15998	14613	1385	8.66%			14613	12741	0	1872	12.8%			0	425	1447	9.9%		
Nov'11		23500	19268	4232	18.01%			19268	15651	0	3617	18.8%			0	435	3182	16.5%		
Dec'11		19180	17837	1343	7.00%			17837	16519	0	1318	7.4%			0	432	886	5.0%		
Jan'12		22050	21609	441	2.00%			21609	20045	0	1564	7.2%			0	439	1125	5.2%		
Feb'12		20410	18981	1429	7.00%			18981	18929	0	52	0.3%			0	434	-382	-2.0%		
Mrt'12		21180	19697	1483	7.00%			19697	18611	0	1086	5.5%			0	435	651	3.3%		
Apr'12		15320	13800	1520	9.92%			13800	17711	0	-3911	-28.3%			0	424	-4335	-31.4%		
May'12		18120	13532	4588	25.32%			13532	13401	0	131	1.0%			0	423	-292	-2.2%		
Jun'12		14320	17033	-2713	-18.95%			17033	13949	0	3084	18.1%			0	430	2654	15.6%		
Jul'12	12/13	15240	14249	991	6.50%	14905	6.78%	14249	11657	0	2592	18.2%	37128	18.1%	0	424	2168	15.2%	31966	15.6%
Aug'12		16190	15154	1036	6.40%			15154	12843	0	2311	15.3%			0	426	1885	12.4%		
Sep'12		19180	17873	1307	6.81%			17873	12908	0	4965	27.8%			0	432	4533	25.4%		
Oct'12		19740	18457	1283	6.50%			18457	13898	0	4559	24.7%			0	433	4126	22.4%		
Nov'12		21050	19471	1579	7.50%			19471	12365	0	7106	36.5%			0	435	6671	34.3%		
Dec'12		34310	31737	2573	7.50%			31737	17841	0	13896	43.8%			0	459	13437	42.3%		
Jan'13		17640	16405	1235	7.00%			16405	15896	0	509	3.1%			0	429	80	0.5%		
Feb'13		16330	14942	1388	8.50%			14942	14280	0	662	4.4%			0	426	236	1.6%		
Mrt'13		15180	14421	759	5.00%			14421	14756	0	-335	-2.3%			0	425	-760	-5.3%		
Apr'13		15810	15020	790	5.00%			15020	15203	0	-183	-1.2%			0	426	-609	-4.1%		
May'13		14920	14025	895	6.00%			14025	12461	0	1564	11.2%			0	424	1140	8.1%		
Jun'13		14250	13181	1069	7.50%			13181	13699	0	-518	-3.9%			0	422	-940	-7.1%		
Jul'13	13/14	15330	14257	1073	7.00%	15449	6.82%	14257	11168	0	3089	21.7%	50710	24.0%	0	425	2664	18.7%	45536	21.6%
Aug'13		14110	13123	987	7.00%			13123	12868	0	255	1.9%			0	422	-167	-1.3%		
Sep'13		16530	15290	1240	7.50%			15290	11328	0	3962	25.9%			0	427	3535	23.1%		
Oct'13		17110	15912	1198	7.00%			15912	13739	0	2173	13.7%			0	428	1745	11.0%		
Nov'13		16180	15128	1052	6.50%			15128	13544	0	1584	10.5%			0	426	1158	7.7%		
Dec'13		19960	18563	1397	7.00%			18563	12783	0	5780	31.1%			0	433	5347	28.8%		
Jan'14		19770	18188	1582	8.00%			18188	13132	0	5056	27.8%			0	432	4624	25.4%		
Feb'14		19350	17996	1354	7.00%			17996	19269	0	-1273	-7.1%			0	432	-1705	-9.5%		
Mrt'14		26287	24569	1718	6.54%			24569	15776	0	8793	35.8%			0	445	8348	34.0%		
Apr'14		23250	21738	1512	6.50%			21738	12771	0	8967	41.3%			0	439	8528	39.2%		
May'14		20489	19330	1159	5.66%			19330	12781	0	6549	33.9%			0	435	6114	31.6%		
Jun'14		18000	16823	1177	6.54%			16823	11048	0	5775	34.3%			0	430	5345	31.8%		
Jul'14	14/15	20702	19348	1354	6.54%	19930	6.30%	19348	12492	0	6856	35.4%	112486	38.0%	0	435	6421	33.2%	107141	36.2%
Aug'14		21490	20181	1309	6.09%			20181	14164	0	6017	29.8%			0	436	5581	27.7%		
Sep'14		23361	22039	1322	5.66%			22039	14210	0	7829	35.5%			0	440	7389	33.5%		
Oct'14		29880	28145	1735	5.81%			28145	14209	0	13936	49.5%			0	452	13483	47.9%		
Nov'14		26828	25310	1518	5.66%			25310	16182	0	9128	36.1%			0	447	8681	34.3%		
Dec'14		33591	31394	2197	6.54%			31394	15257	0	16137	51.4%			0	459	15678	49.9%		
Jan'15		37343	34900	2443	6.54%			34900	20058	0	14842	42.5%			0	466	14376	41.2%		
Feb'15		28266	26417	1849	6.54%			26417	16333	0	10084	38.2%			0	449	9635	36.5%		
Mrt'15		28115	26276	1839	6.54%			26276	17297	0	8979	34.2%			0	449	8530	32.5%		
Apr'15		22388	20924	1464	6.54%			20924	16540	0	4384	21.0%			0	438	3946	18.9%		
May'15		23778	22223	1555	6.54%			22223	13650	0	8573	38.6%			0	440	8133	36.6%		
Jun'15		20562	19217	1345	6.54%			19217	13495	0	5722	29.8%			0	434	5287	27.5%		
Jul'15	15/16	19818	18987	831	4.19%	15899	5.27%	18987	11889	0	7098	37.4%	116115	40.6%	0	434	6664	35.1%	110792	38.8%
Aug'15		20725	19629	1096	5.29%			19629	10387	0	9242	47.1%			0	435	8807	44.9%		
Sep'15		22330	20351	1979	8.86%			20351	11924	0	8427	41.4%			0	437	7990	39.3%		
Oct'15		24388	23851	537	2.20%			23851	13413	0	10438	43.8%			0	444	9994	41.9%		
Nov'15		25565	24118	1447	5.66%			24118	14333	0	9785	40.6%			0	444	9341	38.7%		
Dec'15		31387	29611	1776	5.66%			29611	16791	0	12820	43.3%			0	455	12365	41.8%		
Jan'16		33655	31750	1905	5.66%			31750	17894	0	13856	43.6%			0	460	13397	42.2%		
Feb'16		28203	26860	1343	4.76%			26860	16792	0	10068	37.5%			0	450	9618	35.8%		
Mrt'16		24230	22866	1364	5.63%			22866	15132	0	7734	33.8%			0	442	7292	31.9%		
Apr'16		24230	22866	1364	5.63%			22866	14435	0	8431	36.9%			0	442	7989	34.9%		
May'16		25146	23834	1312	5.22%			23834	12276	0	11558	48.5%			0	444	11114	46.6%		
Jun'16		21937	20992	945	4.31%			20992	14334	0	6658	31.7%			0	438	6220	29.6%		
Jul'16	16/17	18726	16713	2013	10.75%	13178	4.42%	16713	11206	0	5507	33.0%	112123	39.3%	0	429	5078	30.4%	106800	37.4%
Aug'16		20643	20224	419	2.03%			20224	12892	0	7332	36.3%			0	436	6896	34.1%		
Sep'16		27535	24917	2618	9.51%			24917	15650	0	9267	37.2%			0	446	8821	35.4%		
Oct'16		30600	27370	3230	10.56%			27370	15796	0	11574	42.3%			0	451	11123	40.6%		
Nov'16		27084	25684	1400	5.17%			25684	15487	0	10197	39.7%			0	447	9750	38.0%		
Dec'16		35261	34397	864	2.45%			34397	15164	0	19233	55.9%			0	465	18768	54.6%		
Jan'17		27363	26223	1140	4.17%			26223	21161	0	5062	19.3%			0	448	4614	17.6%		
Feb'17		22826	22185	641	2.81%			22185	14480	0	7705	34.7%			0	440	7265	32.7%		
Mrt'17		24730	24592	138	0.56%			24592	13288	0	11304	46.0%			0	445	10859	44.2%		
Apr'17		21353	21030	323	1.51%			21030	13664	0	7366	35.0%			0	438	6928	32.9%		
May'17		21528	21380	148	0.69%			21380	12793	0	8587	40.2%			0	439	8148	38.1%		
Jun'17		20802	20558	244	1.17%			20558	11569	0	8989	43.7%			0	437	8552	41.6%		
Jul'17	17/18	23580	22891	689	2.92%	13827	4.82%	22891	14909	0	7982	34.9%	100747	36.9%	0	442	7540	32.9%	95449	35.0%
Aug'17		23137	22096	1041	4.50%			22096	15611	0	6485	29.3%			0	440	6045	27.4%		
Sep'17		24803	24470	333	1.34%			24470	15303	0	9167	37.5%			0	445	8722	35.6%		
Oct'17		23148	22639	509	2.20%			22639	15022	0	7617	33.6%			0	441	7176	31.7%		
Nov'17		23269	22404	865	3.72%			22404	15221	0	7183	32.1%			0	441	6742	30.1%		
Dec'17		28384	27834	550	1.94%			27834	13840	0	13994	50.3%			0	452	13542	48.7%		
Jan'18		28954	26927	2027	7.00%			26927	15708	0	11219	41.7%			0	450	10769	40.0%		
Feb'18		19376	18213	1163	6.00%			18213	16034	0	2179	12.0%			0	432	1747	9.6%		
Mrt'18		24382	23218	1164	4.77%			23218	13050	0	10168	43.8%			0	442	9726	41.9%		
Apr'18		22760	19536	3224	14.17%			19536	10949	0	8587	44.0%			0	435	8152	41.7%		
May'18		23995	22043	1952	8.14%			22043	12088	0	9955	45.2%			0	440	9515	43.2%		
Jun'18		20794	20484	310	1.49%			20484	14273	0	6211	30.3%			0	437	5774	28.2%		
Jul'18	18/19	23636	22657	979	4.14%	15054	5.14%	22657	9655	0	13002	57.4%	107445	38.7%	0	573	12429	54.9%	100553	36.2%
Aug'18		17276	16522	754	4.36%			16522	13781	0	2741	16.6%			0	561	2180	13.2%		
Sep'18		20948	20098	850	4.06%			20098	10009	0	10089	50.2%			0	568	9521	47.4%		
Oct'18		25263	23399	1864	7.38%			23399	11461	0	11938	51.0%			0	575	11363	48.6%		
Nov'18		26094	24659	1435	5.50%			24659	17026	0	7633	31.0%			0	577	7056	28.6%		
Dec'18		29382	28059	1323	4.50%			28059	13922	0	14137	50.4%			0	584	13553	48.3%		
Jan'19		31748	30362	1386	4.37%			30362	18627	0	11735	38.7%			0	589	11146	36.7%		
Feb'19		24364	23956	408	1.67%			23956	15591	0	8365	34.9%			0	576	7789	32.5%		
Mrt'19		26023	24852	1171	4.50%			24852	15455	0	9397	37.8%			0	578	8819	35.5%		
Apr'19		23392	21508	1884	8.05%			21508	16632	0	4876	22.7%			0	571	4305	20.0%		
May'19		23468	21855	1613	6.87%			21855	15188	0	6667	30.5%			0	572	6096	27.9%		
Jun'19		21401	20014	1387	6.48%			20014	13149	0	6865	34.3%			0	568	6297	31.5%		
Jul'19	19/20	20634	20266	368	1.78%	12498	4.12%	20266	15876	0	4390	21.7%	99189	34.1%	0	539	3851	19.0%	92632	31.9%
Aug'19		23754	22566	1188	5.00%			22566	13555	0	9011	39.9%			0	543	8468	37.5%		
Sep'19		25569	24291	1278	5.00%			24291	14567	0	9724	40.0%			0	547	9177	37.8%		
Oct'19		25219	23958	1261	5.00%			23958	15993	0	7965	33.2%			0	546	7419	31.0%		
Nov'19		27610	26230	1380	5.00%			26230	16113	0	10117	38.6%			0	550	9567	36.5%		
Dec'19		31584	30005	1579	5.00%			30005	16635	0	13370	44.6%			0	558	12812	42.7%		
Jan'20		26374	25055	1319	5.00%			25055	19997	0	5058	20.2%			0	548	4510	18.0%		
Feb'20		26374	26529	-155	-0.59%			26529	14683	0	11846	44.7%			0	551	11295	42.6%		
Mrt'20		27154	27857	-703	-2.59%			27857	17038	0	10819	38.8%			0	554	10265	36.8%		
Apr'20		24334	23175	1159	4.76%			23175	16761	0	6414	27.7%			0	544	5870	25.3%		
May'20		22176	22016	160	0.72%			22016	14585	0	7431	33.8%			0	542	6889	31.3%		
Jun'20		22465	18801	3664	16.31%			18801	15757	0	3044	16.2%			0	536	2508	13.3%		
Jul'20	20/21	22465	19414	3051	13.58%	11148	3.61%	19414	15241	0	4173	21.5%	109072	36.7%	0	1098	3075	15.8%	95769	32.2%
Aug'20		20164	19889	275	1.36%			19889	14506	0	5383	27.1%			0	1099	4284	21.5%		
Sep'20		21045	20386	659	3.13%			20386	14254	0	6132	30.1%			0	1100	5032	24.7%		
Oct'20		27894	27341	553	1.98%			27341	14579	0	12762	46.7%			0	1114	11648	42.6%		
Nov'20		29290	27895	1395	4.76%			27895	14966	0	12929	46.3%			0	1115	11814	42.4%		
Dec'20		29513	28242	1271	4.31%			28242	13789	0	14453	51.2%			0	1115	13338	47.2%		
Jan'21		32588	32722	-134	-0.41%			32722	16077	0	16645	50.9%			0	1124	15521	47.4%		
Feb'21		30379	29650	729	2.40%			29650	17027	0	12623	42.6%			0	1118	11505	38.8%		
Mrt'21		26302	25003	1299	4.94%			25003	13850	0	11153	44.6%			0	1109	10044	40.2%		
Apr'21		24712	23984	728	2.95%			23984	20245	0	3739	15.6%			0	1107	2632	11.0%		
May'21		22107	21706	401	1.81%			21706	16781	0	4925	22.7%			0	1102	3823	17.6%		
Jun'21		21995	21074	921	4.19%			21074	16919	0	4155	19.7%			0	1101	3054	14.5%		
Jul'21	21/22	21657	19694	1963	9.06%	-5379	-1.80%	19694	13338	0	6356	32.3%	139876	46.0%	0	1041	5315	27.0%	127243	41.8%
Aug'21		20106	20498	-392	-1.95%			20498	12513	0	7985	39.0%			0	1043	6942	33.9%		
Sep'21		23953	24226	-273	-1.14%			24226	13830	0	10396	42.9%			0	1050	9346	38.6%		
Oct'21		24068	25339	-1271	-5.28%			25339	14019	0	11320	44.7%			0	1053	10267	40.5%		
Nov'21		26166	26166	0	0.00%			26166	13940	0	12226	46.7%			0	1054	11172	42.7%		
Dec'21		26876	27065	-189	-0.70%			27065	14565	0	12500	46.2%			0	1056	11444	42.3%		
Jan'22		31538	32934	-1396	-4.43%			32934	14255	0	18679	56.7%			0	1068	17611	53.5%		
Feb'22		27655	28469	-814	-2.94%			28469	15531	0	12938	45.4%			0	1059	11879	41.7%		
Mrt'22		27199	28825	-1626	-5.98%			28825	12078	0	16747	58.1%			0	1060	15687	54.4%		
Apr'22		24818	25371	-553	-2.23%			25371	12739	0	12632	49.8%			0	1053	11579	45.6%		
May'22		23384	24102	-718	-3.07%			24102	13572	0	10530	43.7%			0	1050	9480	39.3%		
Jun'22		21498	21608	-110	-0.51%			21608	14041	0	7567	35.0%			0	1045	6522	30.2%		
Jul'22	22/23	19356	21437	-2081	-10.75%	-34490	-12.55%	21437	11681	165	9591	44.7%	134693	43.5%	0	1090	8501	39.7%	121510	39.3%
Aug'22		18696	20936	-2240	-11.98%			20936	14330	165	6441	30.8%			0	1089	5352	25.6%		
Sep'22		21017	23428	-2411	-11.47%			23428	12806	165	10457	44.6%			0	1094	9363	40.0%		
Oct'22		24697	27406	-2709	-10.97%			27406	13900	165	13341	48.7%			0	1102	12239	44.7%		
Nov'22		28594	31967	-3373	-11.80%			31967	15673	165	16129	50.5%			0	1111	15018	47.0%		
Dec'22		27069	29566	-2497	-9.22%			29566	15811	165	13590	46.0%			0	1106	12484	42.2%		
Jan'23		26971	31468	-4497	-16.67%			31468	15265	165	16038	51.0%			0	1110	14928	47.4%		
Feb'23		21512	25316	-3804	-17.68%			25316	15392	165	9759	38.5%			0	1098	8661	34.2%		
Mrt'23		24205	27286	-3081	-12.73%			27286	14400	165	12721	46.6%			0	1102	11619	42.6%		
Apr'23		19760	23407	-3647	-18.46%			23407	14382	165	8860	37.9%			0	1094	7766	33.2%		
May'23		20634	23105	-2471	-11.98%			23105	13746	165	9194	39.8%			0	1093	8101	35.1%		
Jun'23		22334	24013	-1679	-7.52%			24013	15276	165	8572	35.7%			0	1095	7477	31.1%		

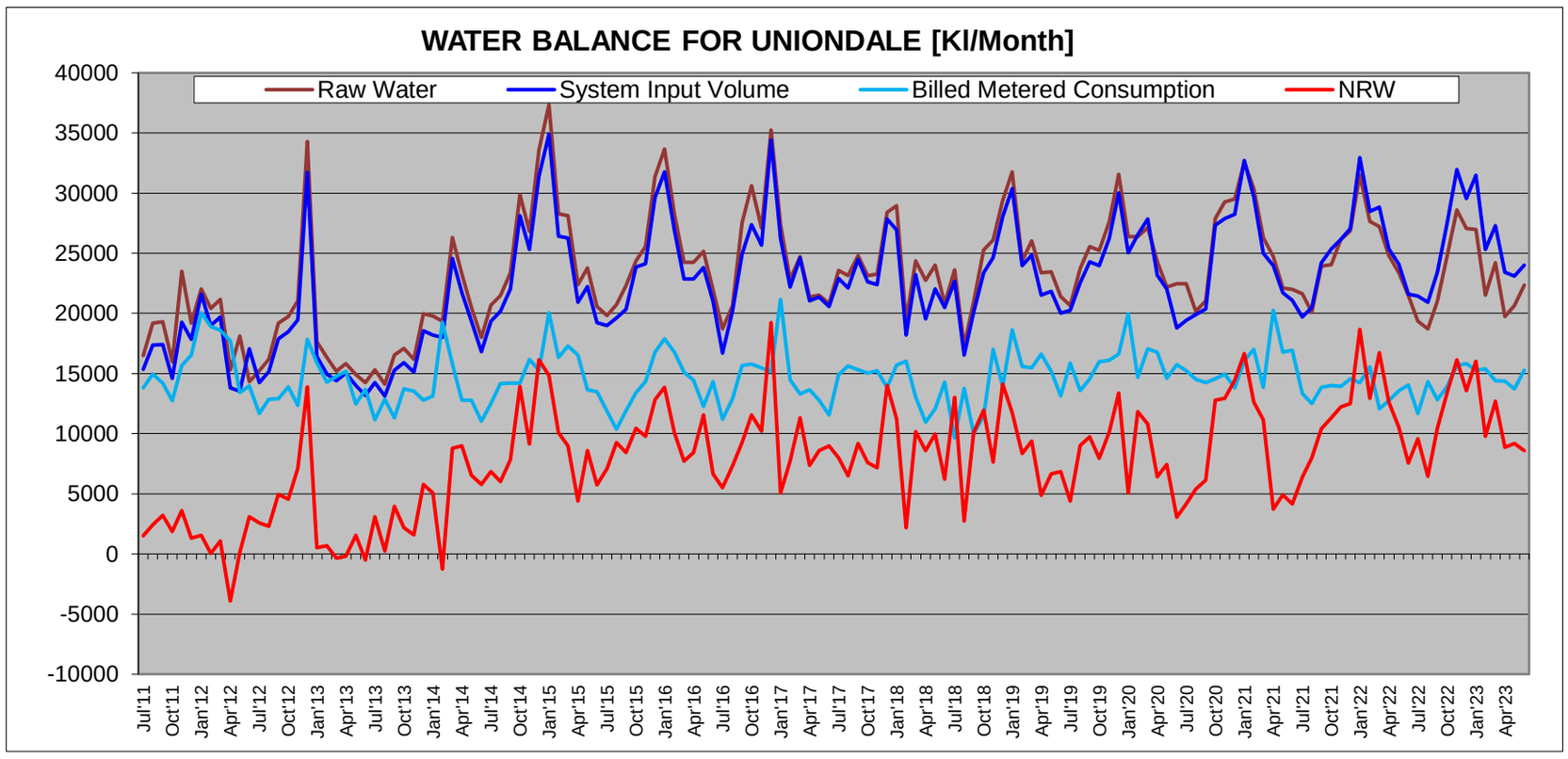
Year	BULK WATER SUPPLY						TREATED WATER SUPPLY													
	Raw Water	System Input Volume	Treatment Losses				System Input Volume	Revenue Water		Non Revenue Water (NRW)										
	Raw Water Supply to WTW	Treated Water after WTW	Monthly Losses	Monthly Losses	Annual Losses	Annual Losses	Treated Water	Billed Metered Consumption	Billed Un-metered Consumption	Monthly NRW	Monthly NRW	Annual NRW	Annual NRW	Unbilled Metered Consumption	Unbilled Un-metered	Monthly Water Losses	Monthly Water Losses	Annual Water Losses	Annual Water Losses
	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[m³]	[%]	[m³]	[%]	[m³]	[m³]	[m³]	[%]	[m³]	[%]
2010/2011																			
2011/2012	225103	206483			18620	8.27%	206483	190522	0			15961	7.73%	0	5165			10796	5.23%
2012/2013	219840	204935			14905	6.78%	204935	167807	0			37128	18.12%	0	5162			31966	15.60%
2013/2014	226366	210917			15449	6.82%	210917	160207	0			50710	24.04%	0	5174			45536	21.59%
2014/2015	316304	296374			19930	6.30%	296374	183888	0			112486	37.95%	0	5345			107141	36.15%
2015/2016	301614	285715			15899	5.27%	285715	169600	0			116115	40.64%	0	5323			110792	38.78%
2016/2017	298451	285273			13178	4.42%	285273	173150	0			112123	39.30%	0	5323			106800	37.44%
2017/2018	286582	272755			13827	4.82%	272755	172008	0			100747	36.94%	0	5298			95449	34.99%
2018/2019	292995	277941			15054	5.14%	277941	170496	0			107445	38.66%	0	6892			100553	36.18%
2019/2020	303247	290749			12498	4.12%	290749	191560	0			99189	34.11%	0	6557			92632	31.86%
2020/2021	308454	297306			11148	3.61%	297306	188234	0			109072	36.69%	0	13303			95769	32.21%
2021/2022	298918	304297			-5379	-1.80%	304297	164421	0			139876	45.97%	0	12633			127243	41.82%
2022/2023	274845	309335			-34490	-12.55%	309335	172662	1980			134693	43.54%	0	13183			121510	39.28%

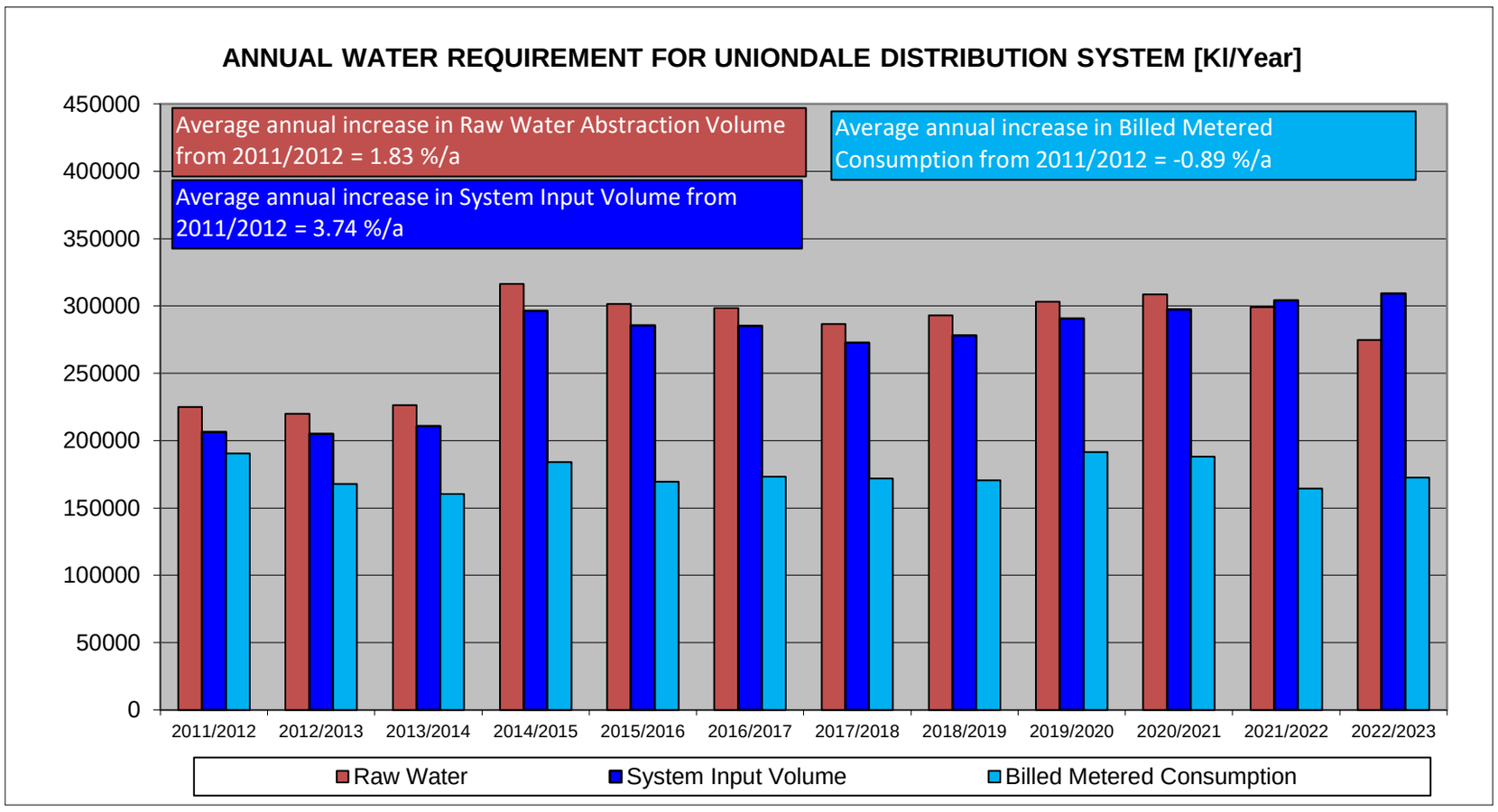
Water Balance Components		Water Balance Volumes								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Consumer Units	Number of connections	1018	893	938	1059	1064	1067	1069	1029	1097
System Input Volume	l/connection/day	798	877	833	706	716	747	762	810	773
Average Billed Metered Cons.	l/connection/day	495	520	506	445	439	492	482	438	431
Non-Revenue Water	l/connection/day	303	356	327	261	277	255	280	372	341

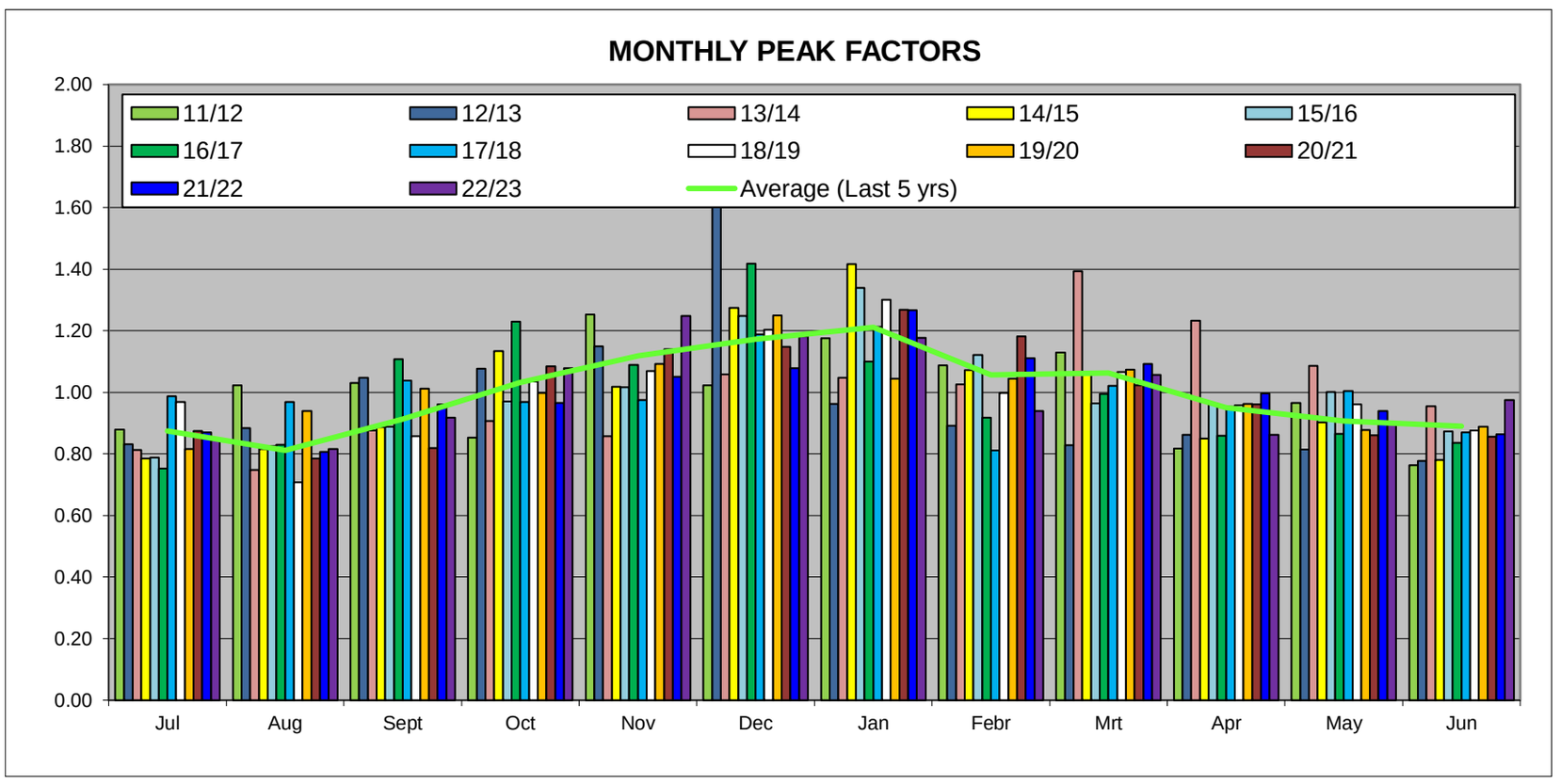
Water Balance Components		Percantage Change in Volumes in l/connection/day, year on year								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume	% Change in Volume	-	9.90%	-4.94%	-15.31%	1.42%	4.31%	2.06%	6.33%	-4.65%
Average Billed Metered Cons.	% Change in Volume	-	5.14%	-2.80%	-12.01%	-1.34%	12.04%	-1.92%	-9.26%	-1.50%
Non-Revenue Water	% Change in Volume	-	17.68%	-8.07%	-20.41%	6.15%	-7.94%	9.76%	33.23%	-8.35%

Water Balance Components		Did volume in l/connection/day Rise or Fall, year on year?								
Component	Units	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
System Input Volume	Rise or Fall	-	Rise	Fall	Fall	Rise	Rise	Rise	Rise	Fall
Average Billed Metered Cons.	Rise or Fall	-	Rise	Fall	Fall	Fall	Rise	Fall	Fall	Fall
Non-Revenue Water	Rise or Fall	-	Rise	Fall	Fall	Rise	Fall	Rise	Rise	Fall

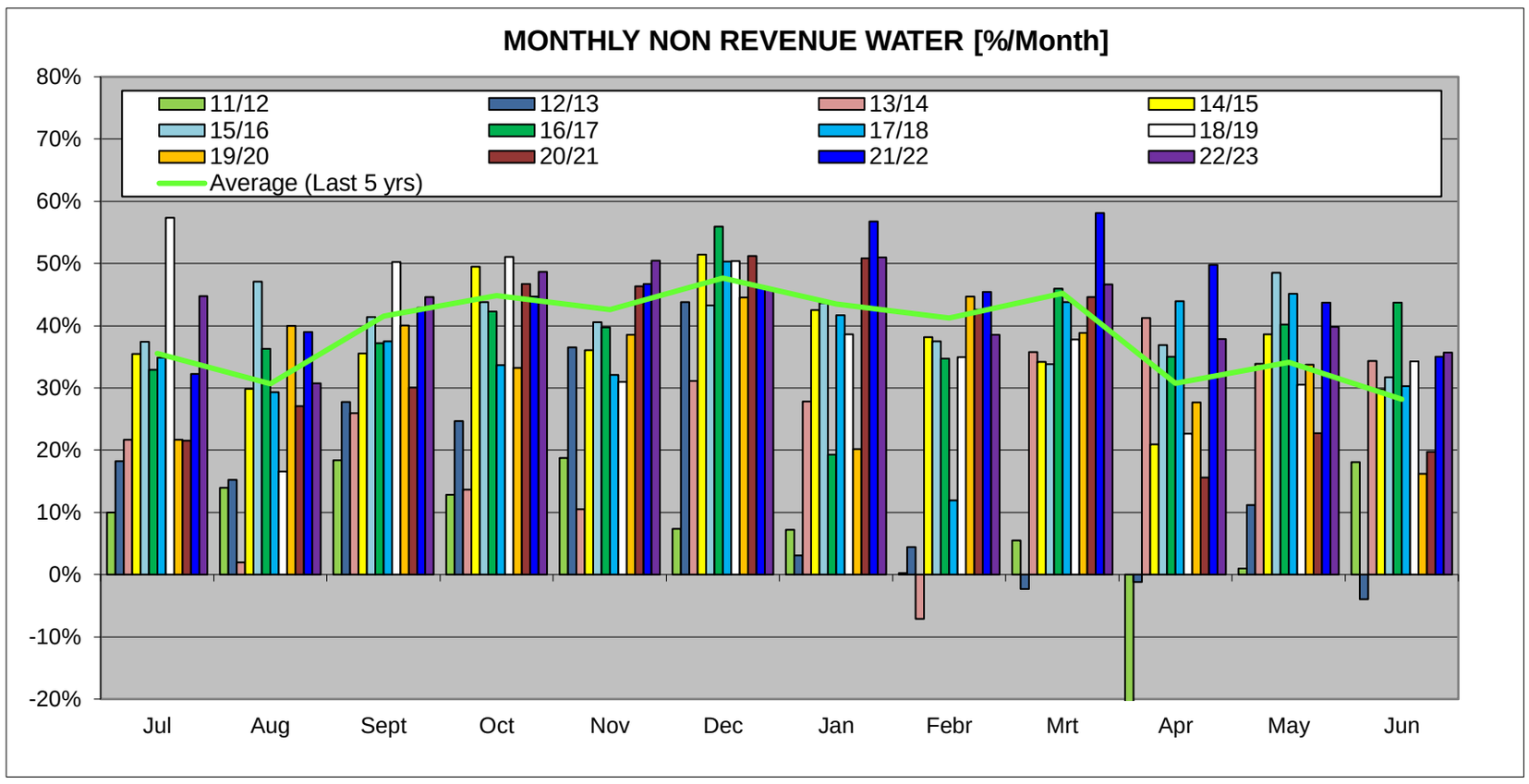
WATER BALANCE AND USAGE FOR UNIONDALE DISTRIBUTION SYSTEM

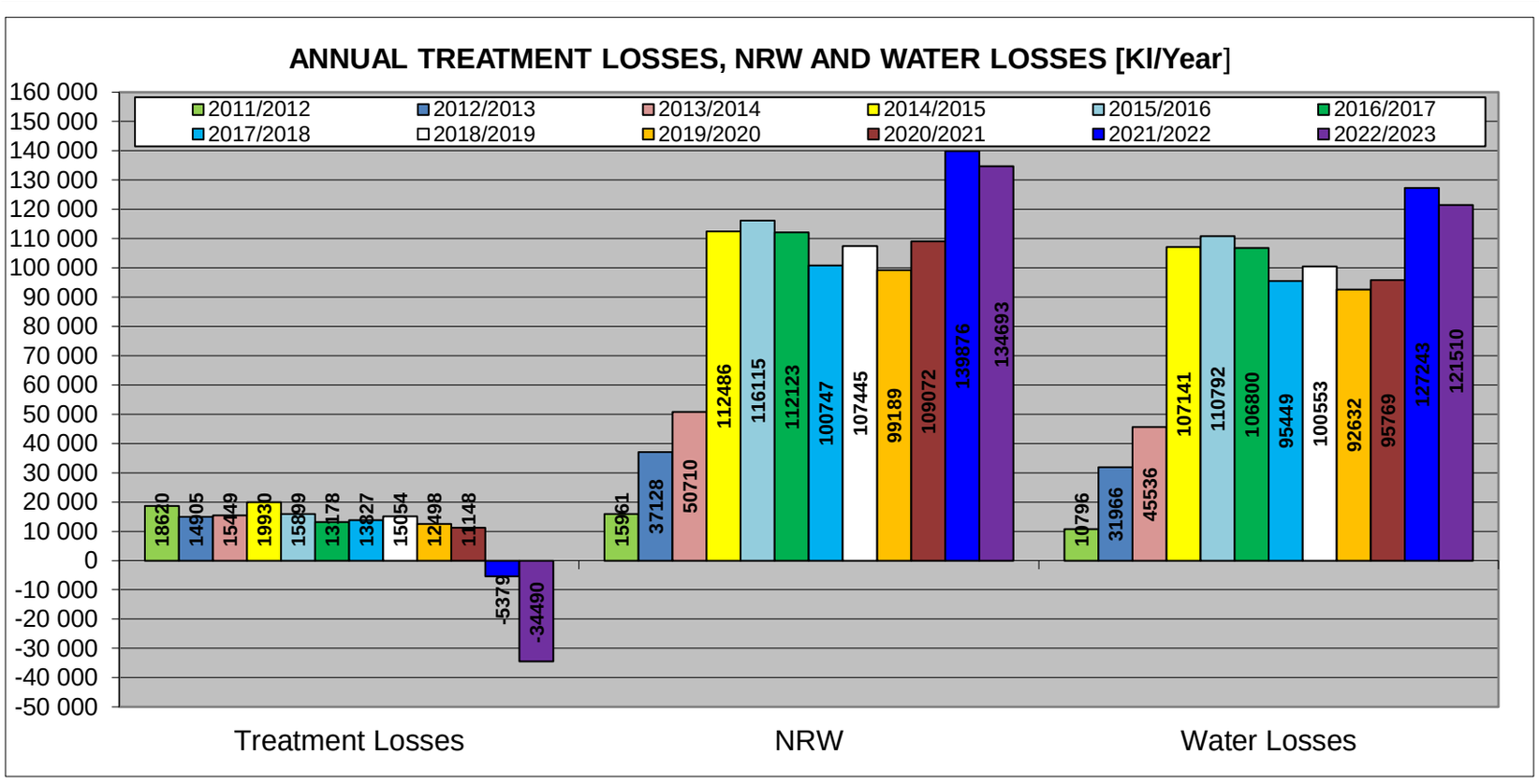


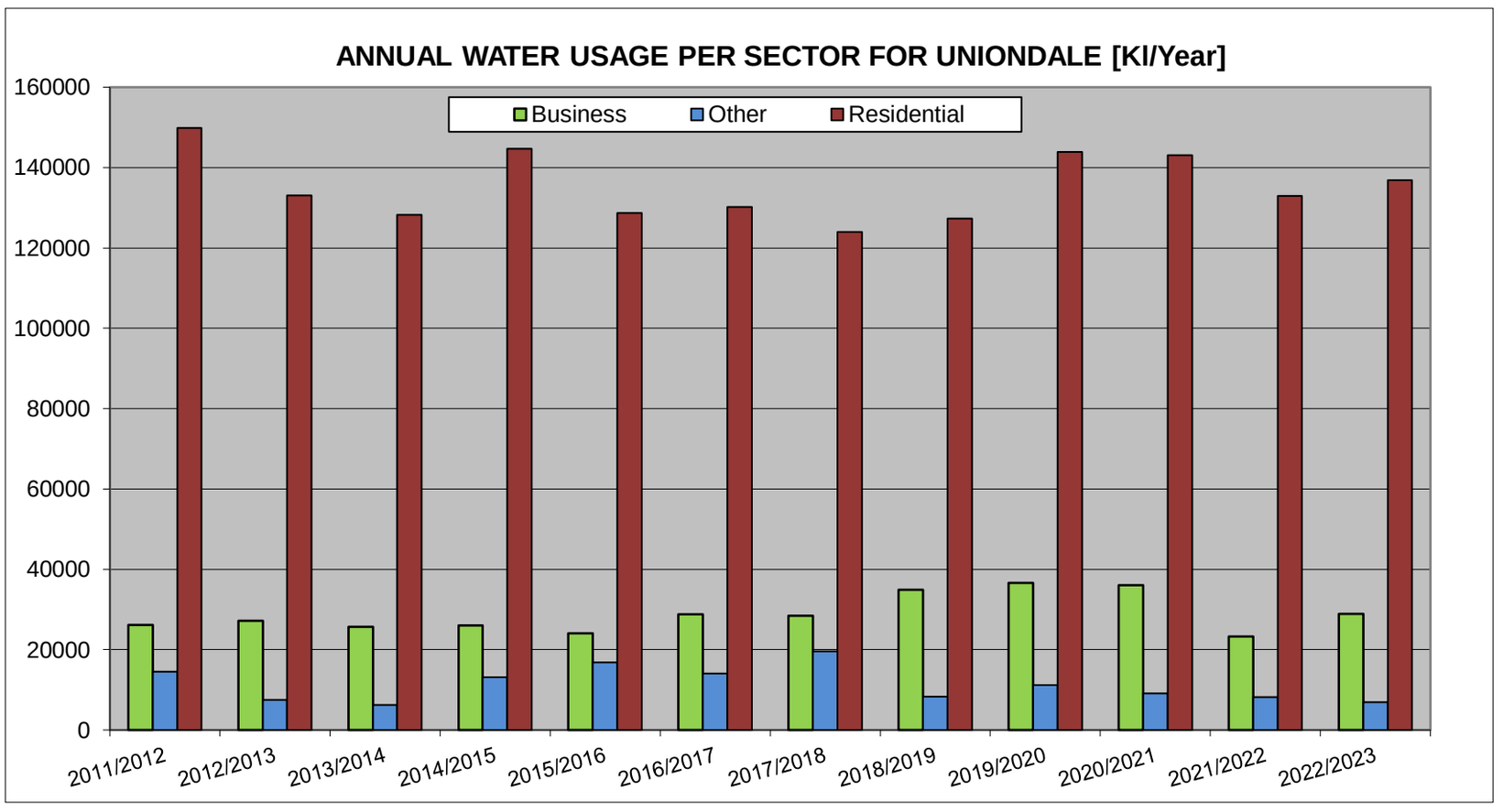




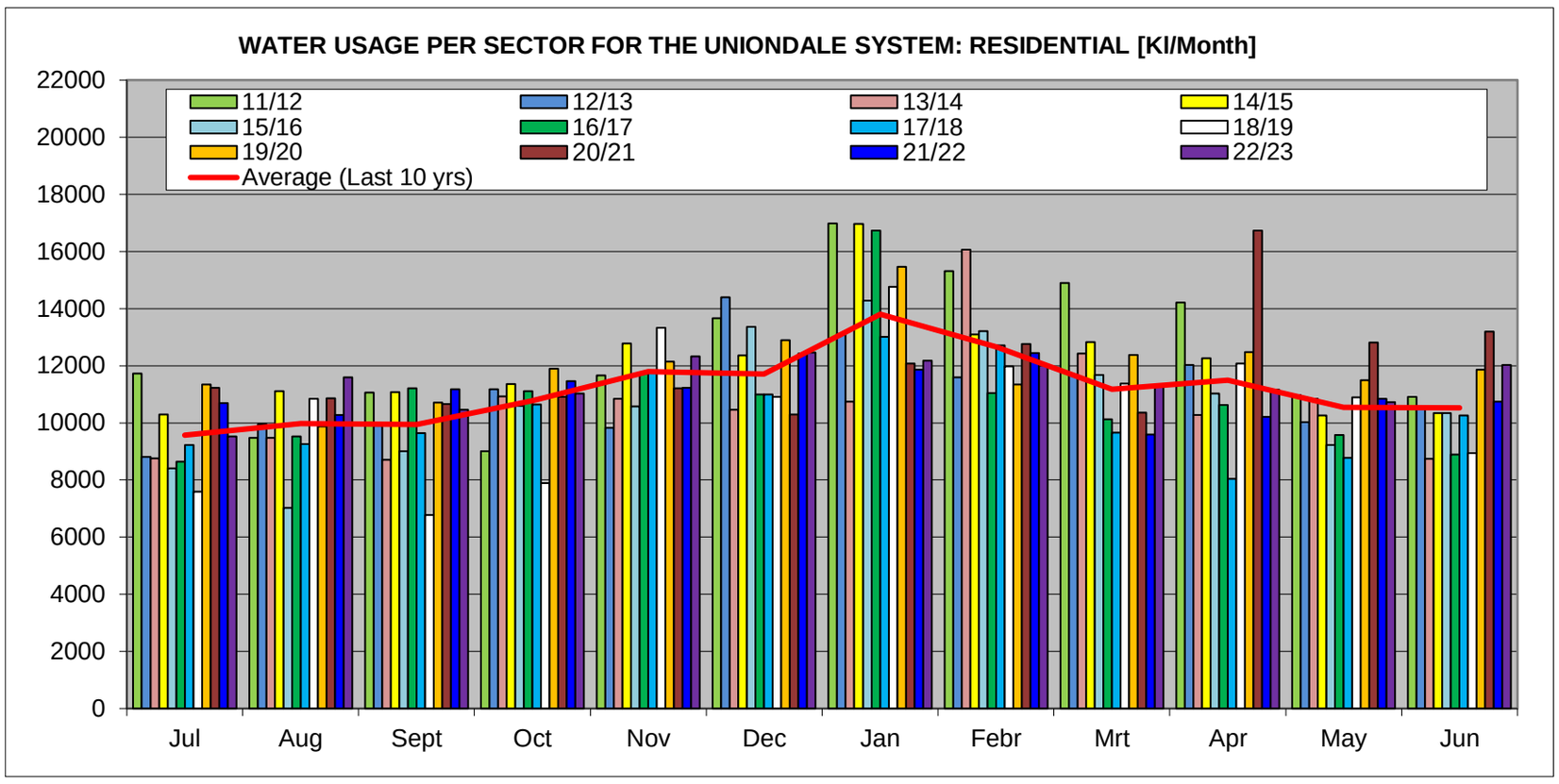
WATER BALANCE AND USAGE FOR UNIONDALE DISTRIBUTION SYSTEM

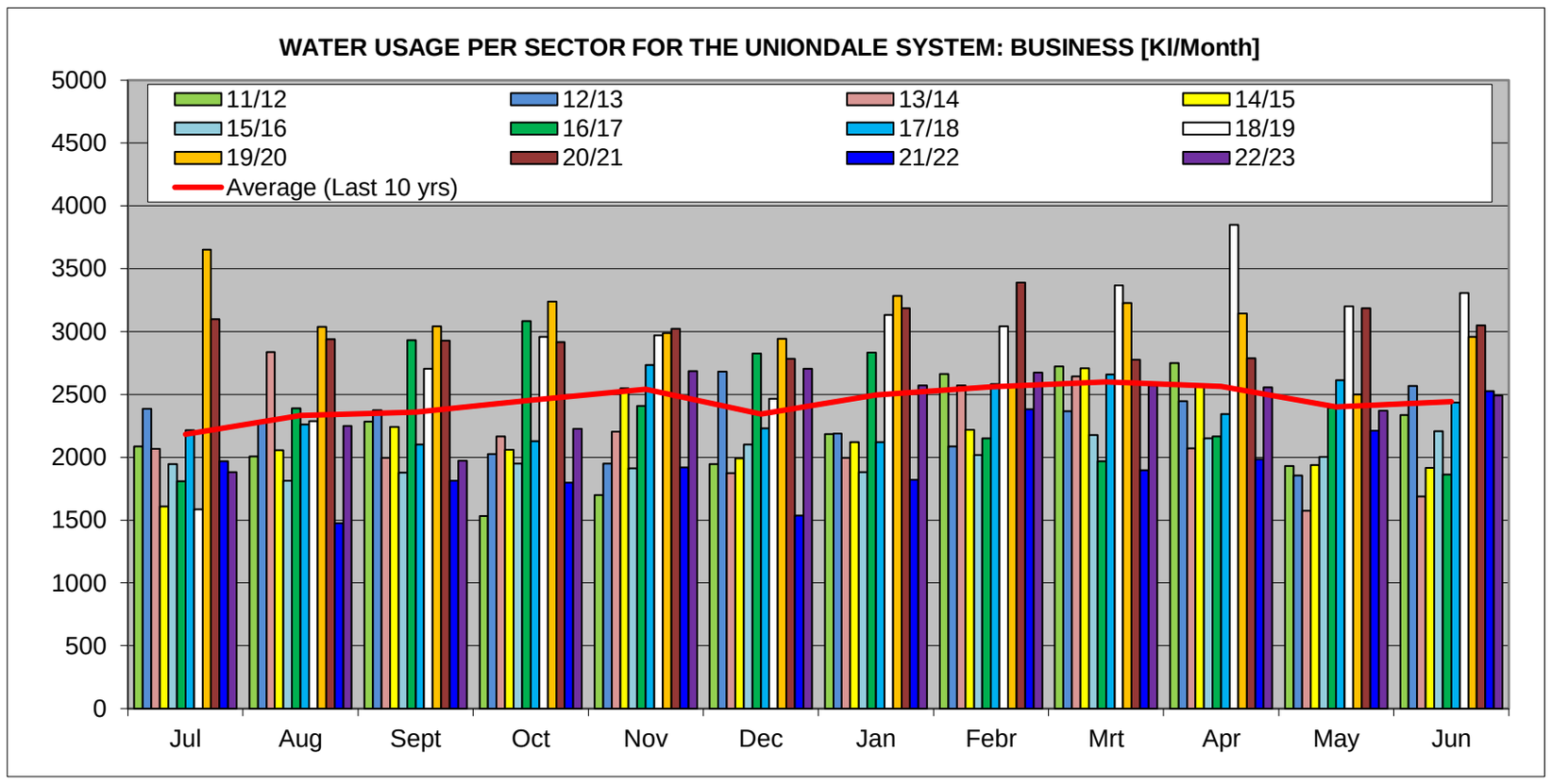


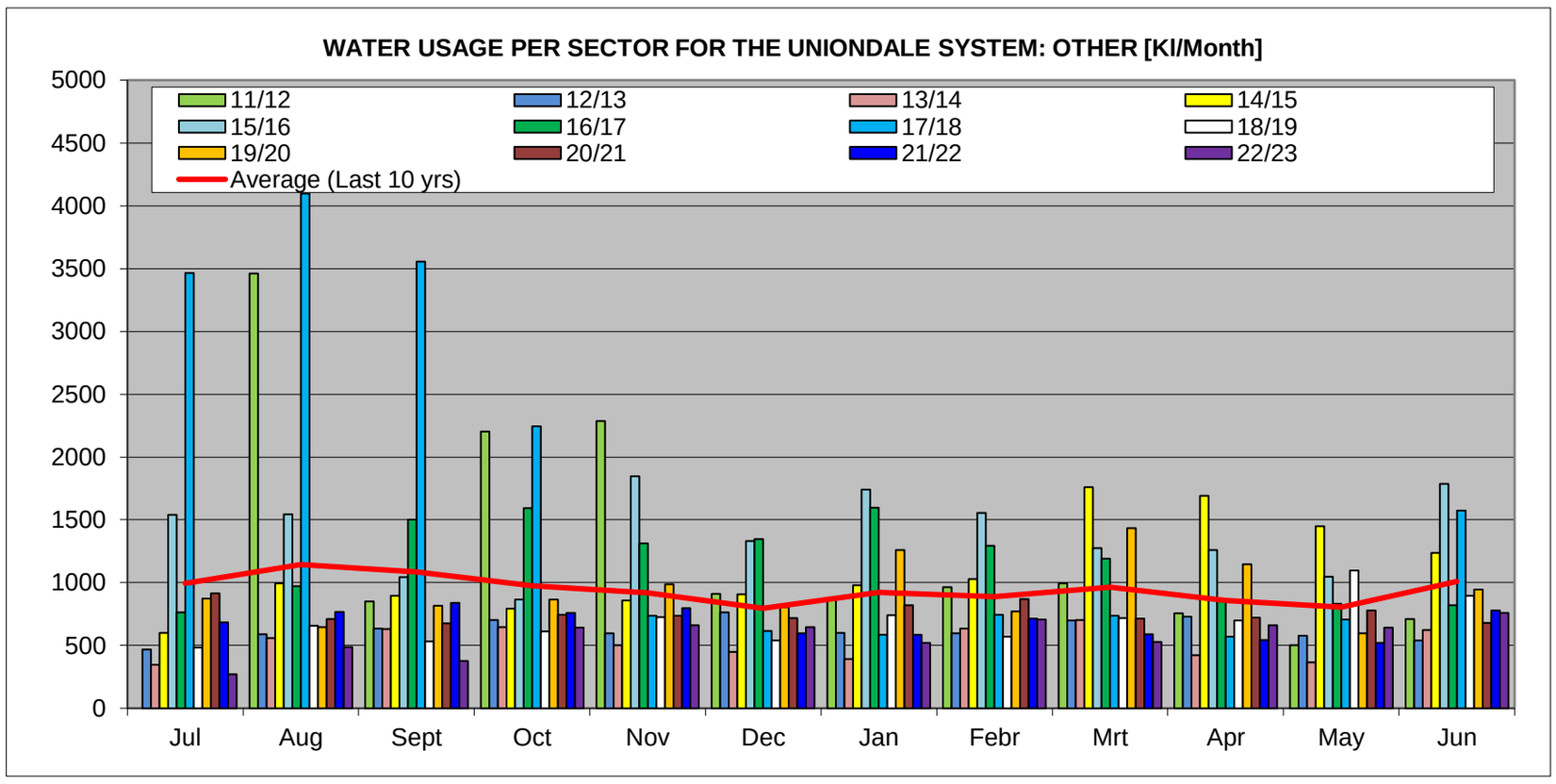




WATER BALANCE AND USAGE FOR UNIONDALE DISTRIBUTION SYSTEM







Monthly flows at WTWs in George Municipality's Management Area

Date	Old George WTWs			New George WTWs			Old and New George WTWs Combined						Ebb & Flow WTWs				Haarlem WTW				Uniondale WTW				Total WWTWs					
	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Capacity	Required Capacity
	kl	kl/d	kl/d	kl	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d
																											ML	kl/d	ML	kl/d	kl/d	kl/d
Jan-03	172398		5561	712060	22970	20000	884448	28531	840226	27104	45000		27480	886	39732	1282	1700															
Feb-03	147855	5281	25000	661214	23615	20000	809079	28896	768625	27451	45000		42170	1506	40132	1433	1700															
Mar-03	132079	4261	25000	733923	23675	20000	866002	27936	802242	25879	45000		36730	1185	34179	1103	1700															
Apr-03	40810	1360	25000	724216	24134	20000	764826	25494	729596	24317	45000		0	0	0	0	1700															
May-03	43559	1405	25000	733930	23675	20000	777489	25080	733692	23667	45000		14740	475	31299	1010	1700															
Jun-03	9423	314	25000	712560	23752	20000	721983	24066	685884	22863	45000		28900	963	42578	1419	1700															
Jul-03	55564	1792	25000	728345	23495	20000	783909	25287	727996	23484	45000		27930	901	35103	1132	1700															
Aug-03	58126	1875	25000	723575	23335	20000	790801	25510	748980	24161	45000		25760	831	32306	1042	1700															
Sep-03	120757	4025	25000	701618	23387	20000	822375	27413	744583	24819	45000		30740	1025	40992	1366	1700															
Oct-03	154660	4989	25000	724524	23373	20000	879223	28367	815342	26301	45000		34000	1097	46912	1513	1700															
Nov-03	182464	6082	25000	713299	23777	20000	895763	29859	853681	28456	45000		30490	1016	41636	1388	1700															
Dec-03	244578	7890	25000	736163	23747	20000	980741	31637	922546	29760	45000		39682	1280	53637	1730	1700															
Jan-04	222169	7167	25000	740794	23897	20000	962963	31063	907266	29267	45000		31790	1025	40516	1307	1700										994753	32089	947782	30574	46700	
Feb-04	156046	5381	25000	693526	23915	20000	849572	29296	807094	27831	45000		33750	1164	35594	1227	1700										883322	30459	842668	29058	46700	
Mar-04	135440	4370	25000	735107	23713	20000	870547	28082	810923	26159	45000		31320	1010	36570	1180	1700										901887	29092	847493	27338	46700	
Apr-04	104598	3487	25000	710089	23670	20000	814687	27156	763426	25448	45000		25380	846	32468	1082	1700										840067	28002	795894	26530	46700	
May-04	90309	2913	25000	738845	23834	20000	829153	26747	773038	24937	45000		28780	928	31419	1014	1700										857931	27675	804457	25950	46700	
Jun-04	76171	2539	25000	711510	23717	20000	787681	26256	729164	24305	45000		24210	807	27733	924	1700										811891	27063	756897	25230	46700	
Jul-04	56497	1821	25000	740713	23894	20000	797175	25715	736174	23748	45000	47495	34850	1124	30304	978	1700	1645									832025	26840	766478	24725	46700	49140
Aug-04	95756	3089	25000	719422	23207	20000	815178	26296	748869	24157	45000	47495	30386	980	26423	852	1700	1645									845564	27276	775292	25009	46700	49140
Sep-04	79462	2649	25000	705842	23528	20000	785304	26177	715381	23846	45000	47495	32100	1070	27921	931	1700	1645									817413	27247	743302	24777	46700	49140
Oct-04	87985	2838	25000	743902	23997	20000	831887	26835	775344	25011	45000	47495	37573	1212	32673	1054	1700	1645									869460	28047	808017	26065	46700	49140
Nov-04	100618	3355	25000	722696	24090	20000	813334	27111	764444	25481	45000	47495	43148	1438	37520	1251	1700	1645									856482	31883	802018	30077	46700	49140
Dec-04	165045	5389	25000	742720	23958	20000	847745	27347	817378	26367	45000	47495	39801	1284	34610	1116	1700	1645									887546	28631	851988	27483	46700	49140
Jan-05	207644	6719	25000	741024	23901	20000	948568	30599	816225	26330	45000	47495	32900	1058	28542	950	1700	1645									981368	31657	842765	27186	46700	49140
Feb-05	97267	3474	25000	659777	23563	20000	757044	27037	710504	25375	45000	47495	34680	1239	31210	1115	1700	1645									791724	28276	741714	26490	46700	49140
Mar-05	102884	3319	25000	743353	23979	20000	846237	27298	798289	25751	45000	47495	38670	1247	35010	1129	1700	1645									884907	28545	833299	26881	46700	49140
Apr-05	71699	2390	25000	718963	23988	20000	790662	26355	734796	24493	45000	47495	35181	1173	33190	1106	1700	1645									827762	27425	767886	25600	46700	49140
May-05	82701	2668	25000	732578	23632	20000	815279	26299	758243	24459	45000	47495	29945	966	28250	911	1700	1645									845224	27265	786493	25371	46700	49140
Jun-05	39907	1330	25000	706598	23533	20000	746505	26550	724726	24158	45000	47495	28514	950	26900	897	1700	1645									825019	27501	751626	25054	46700	49140
Jul-05	106935	3450	25000	722103	23294	20000	829038	26743	771798	24897	45000	52527	38870	1254	36500	1177	1700	1468									867908	27997	808298	26074	46700	53995
Aug-05	95912	3094	25000	719944	23132	20000	814856	26286	761008	24549	45000	52527	30900	997	29020	936	1700	1468									845756	27282	790058	25485	46700	53995
Sep-05	96296	3210	25000	704475	23483	20000	800771	26692	759808	25328	45000	52527	33090	1103	31070	1036	1700	1468									833861	27795	790898	26363	46700	53995
Oct-05	170793	5509	25000	743034	23979	20000	907827	29285	877833	28317	45000	52527	40665	1312	38200	1232	1700	1468									948507	30597	916033	29549	46700	53995
Nov-05	232974	7766	25000	692305	23077	20000	925279	30843	894207	29807	45000	52527	34450	1148	32500	1083	1700	1468									959729	31991	926707	30890	46700	53995
Dec-05	213195	6877	25000	741024	23904	20000	946168	30527	893263	28818	45000	52527	41503	1339	39152	1263	1700	1468									987668	31860	922433	29755	46700	53995
Jan-06	119145	3843	25000	734626	23698	20000	853771	27541	788421	25433	45000	52527	36650	1182	34410	1110	1700	1468									890421	28723	822831	26543	46700	53995
Feb-06	101957	3513	25000	634863	22667	20000	736845	26385	678255	24273	45000	52527	30900	1104	29020	1036	1700	1468									766545	27484	707275	25260	46700	53995
Mar-06	109334	3527	25000	706537	22792	20000	815871	26318	740781	23896	45000	52527	31630	1020	29700	958	1700	1468									847501	27339	770481	24854	46700	53995
Apr-06	123278	4109	25000	712971	23766	20000	836249	27875	784784	26493	45000	52527	29630	988	27820	927	1700	1468									865879	28863	822604	27420	46700	53995
May-06	120948	3784	25000	723254	23331	20000	834200	26910	781172	25205	45000	52527	42890	1384	39800	1155	1700	1468									871090	28093	820971	26479	46700	53995
Jun-06	93245	3108	25000	706826	23561	20000	800071	26669	772885	25763	45000	52527	49650	1655	31320	1044	1700	1468									849721	28324	804205	26807	46700	53995
Jul-06	77528	2501	25000	721039	23254	20000	798557	25760	743124	23972	45000	52709	45490	1479	30000	968	1700	1410									844397	27239	787302	25282	46700	54119
Aug-06	115429	3724	25000	710445	22918	20000	825874	26641	747880	24125	45000	52709	1720	55	0	0	1700	1410									827594	26697	747880	24125	46700	54119
Sep-06	138844	4628	25000	694559	23152	20000	811153	27038	732810	24427	45000	52709	7050	235	33790	1126	1700	1410									818203	27273	766604	25553	46700	54119
Oct-06	138157	4457	25000	716781	23122	20000	854938	27579	799367	25786	45000	52709	29820	962	28000	903	1700	1410									884758	28541	827367	26689	46700	54119
Nov-06	177541	5918	25000	690395	23003	20000	879936	29312	816850	27228	45000	52709	34210	1140	32120	1071	1700	1410									907846	30262	848970	28299	46700	54119
Dec-06	212486	6853	25000	719124	23198	20000	931570	30051	871018	28097	45000	52709	31500	1016	29580	954	1700	1410									963070	31067	900598	29052	46700	54119
Jan-07	197753	6379	25000	729774	23541	20000	1034592	33374	972516	31371	45000	52709	29050	937	27350	882	1700	1410									1054642	34021	991816	31982	46700	54119
Feb-07	252889	9032	25000	656613	23450	20000	909502	32482	859480	30696	45000	52709	20190	721	19050	680	1700	1410									929692	33203	878530	31376	46700	54119
Mar-07	228154	7360	25000	710964	23257	20000	939122	30617	894073	28941	45000	52709	23710	765	20800	671	1700	1410									923832	31382	914873	29512	46700	54119
Apr-07	255590	8520	25000	691259	23042	20000	946849	31562	890038	29668	45000	52709	18980	633	17903	597	1700	1410									965829	32194	907941	30265	46700	54119
May-07	219779	7090	25000	710036	22904	20000	929815	29994	883324	28494	45000	52709	18980	612	17904	578	1700	1410									948795	30606	901228	29072	46700	54119
Jun-07	214917	7164	25000	702895	23431	20000	917812	30594	871861	29062	45000	52709	17420	581	16430	548	1700	1410									935232	31174	888293	29610	46700	54119
Jul-07	180187	5812	25000	748074	24131	20000	928261	29944	852374	27496	45000	47149	15595	516	15035	485	1700	1345									944256	30460	867409	27981	46700	48493
Aug-07	118945	3835	25000	706598	22792	20000	825543	26630	779141	25133	45000	47149	15438	524	13264	492	1700	1345									972245	31363	936345	30205	46700	48493
Sep-07	231175	7706	25000	724737	24158	20000	955912	31864	948814	31627	45000	47149	19926	664	18730	624	1700	1345									975838	32528	967544	32251	46700	48493
Oct-07	251891	8125	25000	731664	23602	20000	983352	31721	944664	30473	45000	47149	20398	658	19174	619	1700	1345									1003750	32379	963838	31092	46700	48493
Nov-07	290834	9694	25000	712126	23738	20000	1002960	33432	963821	32127	45000	47149	18043	601	16960	565	1700	1345									1021003	34033	980781	32693	46700	48493
Dec-07	314512	10145	25000	737328	23785	20000	1051840	33930	1009240	32556	45000	47149	28535	952	26040	905	1700	1345									1122670	36183	1035970	33712	46700	48493
Jan-08	368520	11888	25000	729290	23525	20000	1097810	35413	1031941	33288	45000	47149	18329	591	17229	556	1700	1345									1116139	36004	1049170	33844	46700	48493
Feb-08	324499	11589	25000	743455	24977	20000	1068625	38161	1002316	35228	45000	47149	29295	907	24717	852	1700	1345									1113120	38383	1066331	36080	46700	48493
Mar-08	360140	11617	25000	720160	23231	20000	1080300	34848	1015482	32757	45000	47149	36161	1166	33991	1096	1700	1345									1116461	36015	1049473	33854	46700	48493
Apr-08	281000	9367	25000	678384	22613	20000	1072810	35765	1003807	33436	45000	47149	35953	1198	32243	1075	1700	1345									1081175	36039	1039320	34644	46700	48493
May-08	370240	11943	25000	725670	23409	20000	1095910	35352	1031251	33266	45000	47149	31295	1010	29417	949	1700	1345									1127205	36361	1060668	34215	46700	48493
Jun-08	319507	10650	25000	708840	23628	20000	1028347	34278	966646	32222	45000	47149	19038	635	17896	597	1700	1345									1047385	34913	984542	32818	46700	48493
Jul-08	210148	6779	25000	709699	22893	20000	919844	29672	864552	27880	45000	50132	22830	736	21460	692	1700	1535									942674	30409	886115	28584	46700	51667
Aug-08	249645	8053	25000	694241	22395	20000	943886	30448	887253	28621	45000	50132	17650	569	16591	535	1700	1535									961536	31017	903844	29156	46700	51667
Sep-08	247352	8245	25000	712804	23760	20000	955701	31857	926559	30885	45000	50132	22055	735	20873	696	1700	1535									1007906	33597	947432	31581	46700	51667
Oct-08	336380	10851	25000	743094	23971	20000	1079474	34822	1014705	32732	45000	50132	29714	959	27931	901	1700	1535									1109188	35780	1042636	33633	46700	51667
Nov-08	337934	11264	25000	724363	24121	20000	1062297	37096	1005540	34685	45000	50132	33004	1100	31024	1034	1700	1535									1145881	38196	1071554	35719	46700	51667
Dec-08	407282	13138	25000	739022	23839	20000	1146304	36978	1068355	34463	45000	50132	36488	1177	34299	1106	1700	1535									1182792	38155	1102854	35589	46700	51667
Jan-09	385498	12433	25000	749902	24192	20000	1135438	36627	1067312	34429	45000	50132	40796	1316	38348	1237	1700	1535									1192334	37943	1054660	35666	46700	51667
Feb-09	434785	15528	25000	776736	27741	20000	1211521	43269	1177598	42057	45000	50132	30875	1103	29023	1037	1700	1535									1242396	44371	1206821	43094	46700	51667
Mar-09	342328	11043	25000	763344	24622	20000	1105672	35671	1033803	33348	45000	50132	39797	1284	37409	1207	1700	1535									1145469	36951	1072132	34555	46700	51667
Apr-09	298595	9620	25000	728966	24299	20000	1017561	33919	931412	31047	45000	50132	36046	1202	33883	1129	1700	1535									1053607	35120	969295	32177	46700	51667
May-09	309042	9969	25000	751434	24240	20000	1041726	33604	992248	32008	45000	50132	34493	1241	31223	1186	1700	1535									1012219	34678	1029372	33206	46700	51667
Jun-09	252790	8426	25000	758010	25267	20000	1010800	33693	993114	31970	45000	50132	24667	822	23187	773	1700	1535									1035467	34516	982301	32743	46700	51667
Jul-09	276089	8909	25000	786110	25359	20000	1062199	34264	1019353	32882	45000	50797	31621	1020	29554	953	1700	1392	31178	1006	29842	963	1700	1392	1068059	34453	1049196	33844	46700	52189
Aug-09	294638	9504	25000	713490	23016	20000	1008128	32520	948084	30519	45000	50797	36305	1171	34127	1101	1700	1392	29744	960	28004	903	1700	1392	1044433	33691	980211	31620	46700	52189
Sep-09	209990	7000	25000	723320	24111	20000	933310	31110	879178	29306	45000	50797	34304	1143	32246	1075	1700	1392	29744	991	27953	932	1700	1392	967614	32254	911424	30381	46700	52189
Oct-09	205138	6617	25000	693450	22369	20000	898588	28988	865001	27597	45000	50797	31768	1025	29862	963	1700	1392	30824	994	28971	935	1700	1392	936404	30213	895363	28950	46700	52189
Nov-09	197656	6589	25000	641780	21393	20000	839436	27981	789070	26302	45000	50797	32724	1091	30761	1025	1700	1392	30824	1027	28971	965	1700	1392	872160	29072	819831	27328	46700	52189
Dec-09	196057	6325	25000	724804	23381	20000	920859	29706	865287	27912	45000	50797	39857	1286	37475	1209	1700	1392	31820	1026	29924	965	1700	1392	989564	31937	957331	30882	46700	52189
Jan-10	135501	4373	25000	623360	20108	20000	758911	24481	720965	23257	45000	50797	39231	1266	36877	1190	1700	1392	31820	1026	29924	965	1700	1392	798142	25747	757842	24447	46700	52189
Feb-10	159761	5599	25000	577350	20620	20000	737111	26318	686393	24514	45000	50797	30985	1103	29032	1037	1700	1392	30824	1027	28971	965	1700	1392	768996	27431	715425	25551	46700	52189
Mar-10	118184	3812	25000	630980	20354	20000	749164	24167	722996	23322	45000	50797	34996	1129	32896	1061	1700	1392	30824	994	28971	935	1700	1392	784160	25295	756892	24384	46700	52189
Apr-10	95341	3178	25000	631220	21041	20000	726561	24219	673567	22452	45000	50797	31045	1035	29182	973	1700	1392	30824	994	28971	935	1700	1392	757606	25254	702749	23425	46700	52189
May-10	130659	4215	25000	650490	20984	20000	781149	25198	728031	23485	45000	50797	28308	913	26610	858	1700	1392	30824	994	28971	935	1700	1392	809457	26112	754641	24343	46700	52189
Jun-10	73488	2450	25000	538320	17927	20000	611808	23727	541981	21266	45000	50797	29021	967	27280	909	1700	1392	30824	994	28971	935	1700	1392	740529	24694	697353	22975	46700	52189
Jul-10	71199	2490	25000	672340	21688	20000	749539	24179	700819	22607	45000	50154	27073	873	25447	821	1700	1406									776610	25052	726266	23428	46700	51559
Aug-10	51872	1673	25000	676000	21806	20000	727872	23835	690845	22285	45000	50154	29010	936	27269	880	1700	1406									767382	24770	718114	23165	46700	51559
Sep-10	54554	1818	25000	667200	22240	20000	721754	24058	674840	22495	45000	50154	30286	1010	28469	949	1700	1406									752040	25068	703309	23444	46700	51559
Oct-10	37930	1223	25000	675200	21781	20000	713130	23004	661981	21423	45000	50154	29405	949	27641	892	1700	1406									738603	23858	713764	23146	46700	51559
Nov-10	91970	3066	25000	615300	20510	20000	707270	23576	691875	23063	45000	50154	34060	1135	32016	1067	1700	1406									741330	24711	723891	24130	46700	51559
Dec-10	94184	3038	25000	583500	20252	20000	677684	23585	641985	22329	45000	50154	32762	1057	30796	993	1700	1406									810546	26147	722351	24928	46700	51559
Jan-11	115828	3736	25000	671100	21648	20000	786928	25385	734833	23704	45000	50154	37341	1205	35101	1132	1700	1406									824269	26589	769934	24837	46700	51559
Feb-11	145631	5201	25000	622200	22221	20000	767831	27423	705245	25330	45000	50154	27517	983	25866	924	1700	1406									795348	28405	735111	26254	46700	51559
Mar-11	192071	6196	25000	673900	21739	20000	865971	27935	807950	26063	45000	50154	35394	1142	33270	1073	1700	1406									901365	29076	841220	27136	46700	51559
Apr-11	153892	5129	25000	681200	22707	20000	835092	27836	764270	25476	45000	50154	30448	978	27987	933	1700	1406									818779	27293	792435	26395	46700	51559
May-11	125228	4040	25000	670400	21626	20000	795628	25665	743912	23997	45000	50154	18008	581	16928	546	1700	1406									813636	26246	760840	24543	46700	51559
Jun-11	117054	3902	25000	655310	21777	20000	772364	25745	743806	24794	45000	50154	5388	180	5074	169	1700	1406									787562	26525	754681	25429	46700	51559
Jul-11	130059	4195	25000	658400	21239	20000	788459	25434	727209	23458	45000	55772	380	12	357	12	1700	1427	8835	285	8216	265	1000	812	16500	532	15345	495	1500	1228	814174	26254	751127	24230	49200	59240
Aug-11	147567	4760	25000	711133	22939	20000	858701	27700	785503	25468	45000	55772	29282	945	26975	870	1700	1427	42170	1360	41506	1339	1000	812	19200	619	17376	561	1500	1228	813603	26818	771782	24895	49200	59240
Sep-11	166568	5552	25000	632990	21100	20000	799558	26652	747587	24920	45000	55772	26390	880	24542	818	1700	1427	7424	247	6867	229	1000	812	19325	644	17392	580	1500	1228	852697	28423	786388	26546	49200	59240
Oct-11	197043	6357	25000	651800	21029	20000	848843	27380	803131	25910	45000	55772	23163	747	21731	701	1700	1427	6500	210	6098	197	1000	812	15988	516	14613	471	1500	1228	871799	28187	820743	26521	49200	59240
Nov-11	202578	6753	25000	615100	20503	20000	817678	27256	760768	25359	45000	55772	25937	865	23862	795	1700	1427	6252	208	5658	189	1000	812	23500	783	19268	642	1500	1228	873367	29112	809556	26985	49200	59240
Dec-11	245739	7927	25000	672830	21697	20000	918569	29614	858549	27695	45000	55772	34838	1124	32574	1051	1700	1427	13000	419	11850	382	1000	812	19180	619	17837	575	1500	1228	985057	31776	950255	30655	49200	59240
Jan-12	266144	8585	25000	683400	22045	20000	949544	30630	922545	29534	45000	55772	35947	1160	33430	1078	1700	1427	13440	434	10752	347	1000	812	22050	711	21609	697	1500	1228	1020981	32935	988336	29656	49200	59240
Feb-12	229251	8188	25000	629400	22907	20000	858651	30656	851603	27568	45000	55772	31320	1010	30570	986	1700	1427	12210	397	10313	356	1000	812	20410	704	19861	655	1500	1228	954086	32900	952726	29570	49200	59240
Mar-12	157104	5068	25000	708450	22853	20000	865554	27921	804965	25967	45000	55772	24863	802	23172	747	1700	1427	4930	159	4585	148	1000	812	21180	683	19697	635	1500	1228	916527	29

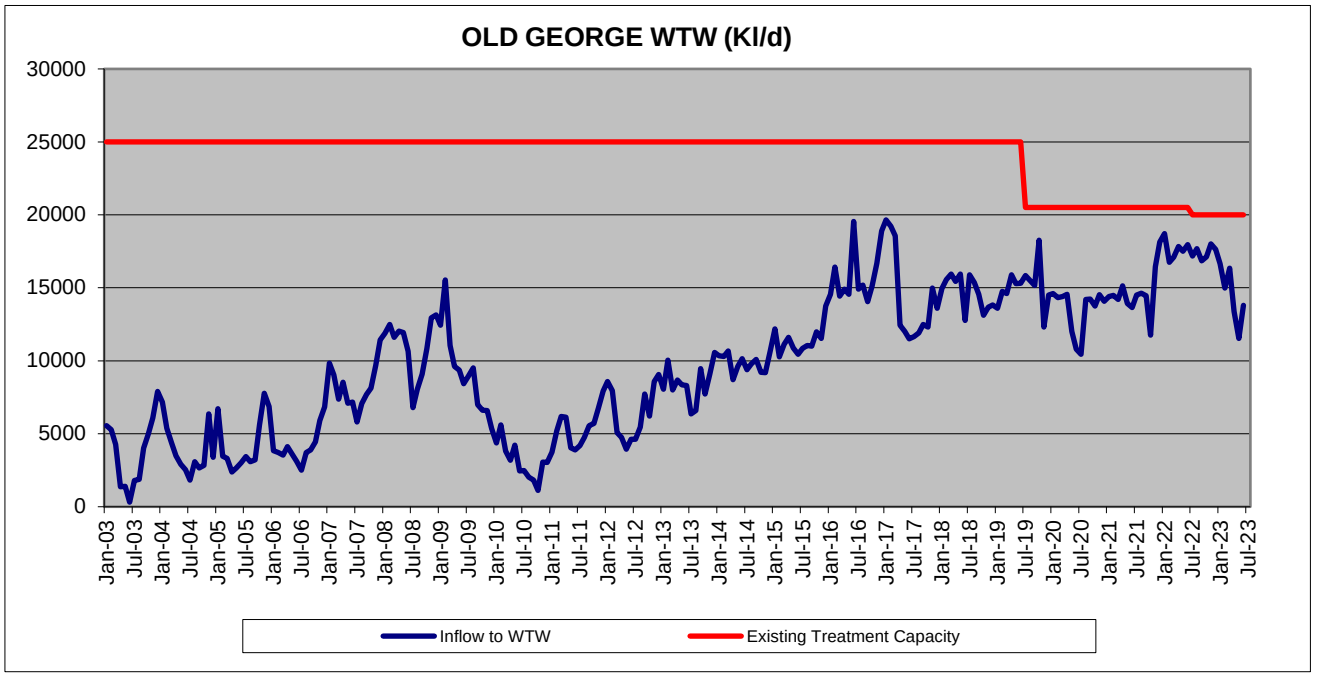
Monthly flows at WTWs in George Municipality's Management Area

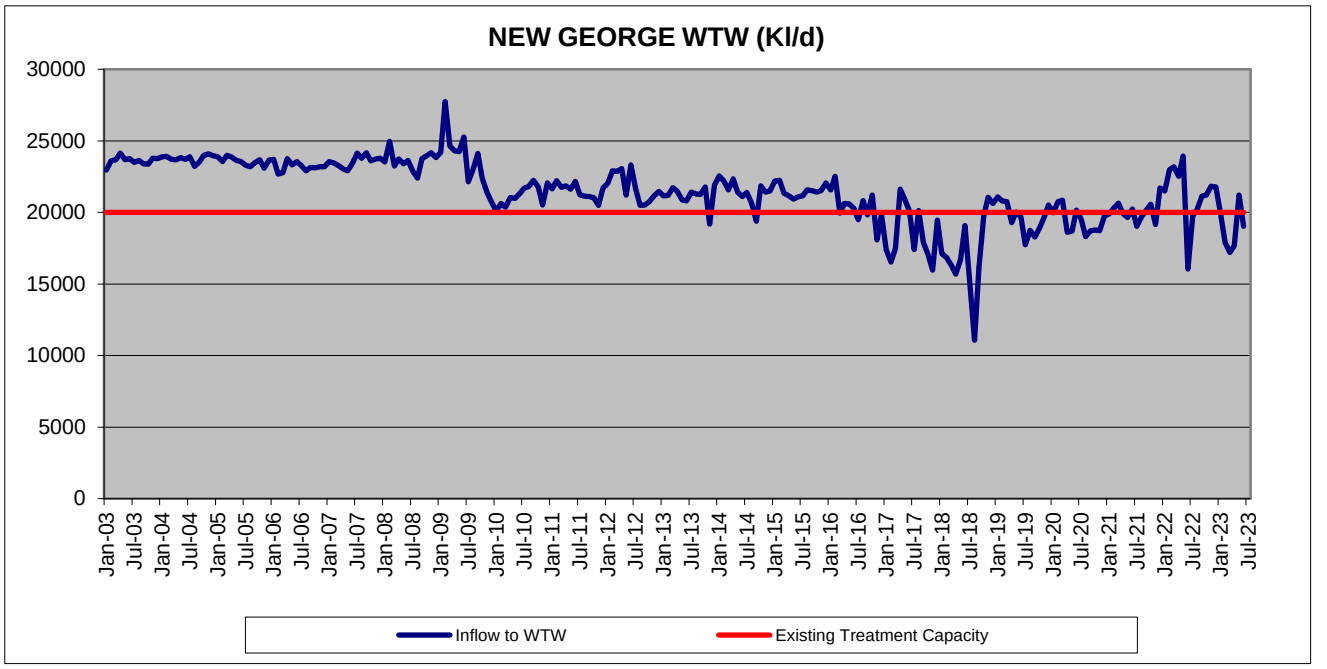
Date	Old George WTWs			New George WTWs			Old and New George WTWs Combined						Ebb & Flow WTWs				Haarlem WTW				Uniondale WTW				Total WTWs				
	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 1.5% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Capacity	Required Capacity
	kl	kl/d	kl/d	kl	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	ML	kl/d	ML	kl/d	kl/d	kl/d
Jul-17	361043	11647	25000	539800	17413	20000	900843	29056	900301	29050	45000	59999	31481	1016	29582	955	1700	1309	21102	681	14308	462	1000	812	23580	761	22891	738	1500	1208	977006	31516	975092	31455	49300	62728
Aug-17	368875	11899	25000	523700	20119	20000	892575	32019	879399	28365	45000	59999	27140	875	25783	832	1700	1309	18886	609	11785	380	1000	812	23137	746	22096	713	1500	1208	1061788	34250	959303	30951	49300	62728
Sep-17	374323	12480	25000	503900	16797	20000	911431	30381	848427	28281	45000	59999	26060	869	24657	822	1700	1309	17298	577	11257	375	1000	812	24803	827	24153	805	1500	1208	974659	32489	909328	30311	49300	62728
Oct-17	381451	12305	25000	530300	17106	20000	911751	29411	881662	28441	45000	59999	25600	826	24462	789	1700	1309	17074	551	15928	514	1000	812	23148	747	22639	730	1500	1208	981182	31651	947381	30570	49300	62728
Nov-17	449871	14996	25000	478800	15960	20000	928671	30956	875462	29182	45000	59999	22899	763	21832	727	1700	1309	17010	567	16619	554	1000	812	23268	776	21404	713	1500	1208	991252	33042	938227	31208	49300	62728
Dec-17	421492	13597	25000	603300	19461	20000	1024792	33058	1007194	32490	45000	59999	23135	746	21841	705	1700	1309	19864	641	19752	637	1000	812	23287	751	22834	737	1500	1208	1102115	35554	1083011	34936	49300	62728
Jan-18	414964	13386	25000	529600	17126	20000	944709	30474	931961	29160	45000	59999	24524	791	22830	736	1700	1309	17287	558	16561	534	1000	812	23954	934	23927	869	1500	1208	1065995	34387	971150	31327	49300	62728
Feb-18	393879	13959	25000	471900	16410	20000	907519	32411	909577	29967	45000	59999	25910	833	24821	797	1700	1309	14905	532	14551	503	1000	812	23976	992	23913	869	1500	1208	964710	34454	884878	31603	49300	62728
Mar-18	454994	14680	25000	502600	16310	20000	999594	32245	957171	27426	45000	59999	25899	835	24877	802	1700	1309	16425	530	15548	502	1000	812	24382	787	23218	749	1500	1208	1068994	34484	975914	29546	49300	62728
Apr-18	462794	15426	25000	470800	15693	20000	933584	31120	950473	31682	45000	59999	24729	824	24545	775	1700	1309	14640	488	14553	467	1000	812	23760	792	23638	751	1500	1208	999123	33191	1014470	33815	49300	62728
May-18	481586	15954	25000	615100	19842	20000	1012583	32664	971464	28199	45000	59999	32065	1035	30153	973	1700	1309	12548	405	12200	394	1000	812	23795	774	23543	733	1500	1208	1081206	34878	935852	30272	49300	62728
Jun-18	392815	13094	25000	512000	17067	20000	904815	30161	814387	27129	45000	59999	28431	948	25425	848	1700	1309	11545	385	11259	375	1000	812	23795	793	23484	783	1500	1208	1016153	33869	875059	29170	49300	62728
Jul-18	418957	13577	25000	460800	15097	20000	879757	28544	819468	26434	45000	60597	28223	910	26477	854	1700	1309	12576	406	11758	379	1000	812	23636	762	23557	760	1500	1244	1023543	33072	880131	28391	49300	63917
Aug-18	426307	13815	25000	343134	11099	20000	769441	26440	792504	25565	45000	60597	29788	961	27769	896	1700	1309	12745	411	12508	403	1000	812	23526	759	23552	760	1500	1244	893683	28796	862877	27828	49300	63917
Sep-18	436402	14547	25000	485100	16170	20000	921502	30717	878938	29295	45000	60597	29483	983	28122	937	1700	1309	13912	464	13428	448	1000	812	23948	798	23208	774	1500	1244	1009450	33648	960652	32022	49300	63917
Oct-18	406900	13126	25000	522400	16748	20000	1029300	33203	928161	29941	45000	60597	29462	951	28482	919	1700	1309	14696	474	14599	471	1000	812	24263	783	23399	755	1500	1244	985790	32860	940077	31335	49300	63917
Nov-18	429932	14331	25000	631600	21053	20000	1041500	34717	958300	31944	45000	60597	30661	1022	28823	961	1700	1309	15296	510	15642	521	1000	812	24264	809	24059	802	1500	1244	1071458	35715	1004675	33489	49300	63917
Dec-18	429932	13868	25000	532000	21019	20000	1067532	34446	958334	30914	45000	60597	30721	1216	27155	1151	1700	1309	15457	515	15655	505	1000	812	24307	849	24059	776	1500	1244	1154873	37254	1049853	33866	49300	63917
Jan-19	415255	13604	25000	532000	21019	20000	1079715	34829	948961	30612	45000	60597	39105	1261	37155	1198	1700	1309	19312	623	18534	598	1000	812	24307	1024	24282	979	1500	1244	1165880	37609	1025007	33387	49300	63917
Feb-19	413905	14268	25000	505600	20000	20000	1056033	36566	947378	30974	45000	60597	29167	1041	27957	998	1700	1309	14155	505	13855	495	1000	812	24364	870	23956	855	1500	1244	1064184	38004	931106	33325	49300	63917
Mar-19	415232	14598	25000	547800	20736	20000	1050042	35586	963156	30431	45000	60597	31407	1087	29966	956	1700	1309	14155	490	13809	445	1000	812	24823	839	24852	802	1500	1244	1168028	37978	1011617	32535	49300	63917
Apr-19	415232	14598	25000	547800	20736	20000	1050042	35586	963156	30431	45000	60597	31407	1087	29966	956	1700	1309	15197	490	14809	477	1000	812	24823	839	24852	802	1500	1244	1168028	37978	1011617	32535	49300	63917
May-19	474100	15295	25000	520800	20000	20000	1050850	35321	937747	30253	45000	60597	30257	975	28745	927	1700	1335	13801	445	13201	426	1000	824	23482	757	21855	705	1500	1226	1162537	37501	1001568	32309	49300	63917
Jun-19	474100	15803	25000	477600	17767	20000	1015500	33850	969757	32325	45000	60597	29445	982	27983	933	1700	1335	12412	414	11997	400	1000	824	23401	780	23014	767	1500	1226	1113135	37105	993071	33102	49300	63917
Jul-19	490676	15639	25000	501600	17756	20000	1041176	33039	899565	29188	45000	60597	28953	935	27057	873	1700	1362	16542	534	13987	451	1000	837	23634	666	23266	654	1500	1244	1107015	35710	963185	30969	44700	65243
Aug-19	490676	15826	25000	561800	18290	20000	1003364	32657	870697	28377	45000	61796	31060	1002	29033	936	1700	1362	16542	534	15387	496	1000	837	23564	760	23556	760	1500	1244	1136309	36612	975052	31582	44700	65243
Sep-19	515158	17172	25000	561800	18727	20000	1003364	33446	870697	29023	45000	61796	31060	1035	29033	968	1700	1362	15825	527	15315	511	1000	837	23569	852	23569	852	1500	1244	1077662	35922	940059	31335	44700	65243
Oct-19	494584	15954	25000	546000	18871	20000	1032835	33137	903769	29541	45000	61796	31060	1002	29033	936	1700	1362	16780	541	15577	503	1000	837	23615	909	23259	750	1500	1244	1122343	36183	982538	31691	44700	65243
Nov-19	499430	16648	25000	535400	17847	20000	1035229	34507	911505	30383	45000	61796	24957	832	23783	793	1700	1362	16410	547	15777	526	1000	837	23615	909	23259	775	1500	1244	1027227	34241	951587	31720	44700	65243
Dec-19	499430	16114	25000	535400	17269	20000	1035229	33376	911505	29403	45000	61796	24957	1093	23783	1036	1700	1362	16274	570	15733	549	1000	837	23583	761	23555	760	1500	1244	1169875	37709	1050484	33851	44700	65243
Jan-20	515158	16618	25000	561800	18122	20000	1003364	34602	870697	29023	45000	61796	26657	860	25355	817	1700	1362	15825	498	14658	473	1000	837	23574	853	23569	908	1500	1244	1141105	36810	955575	30825	44700	65243
Feb-20	533500	19054	25000	561800	20062	20000	1003364	35841	870697	31095	45000	61796	27107	968	25355	905	1700	1362	13464	464	13464	464	1000	837	23574	909	23259	909	1500	1244	1064475	37196	896765	30923	44700	65243
Mar-20	446190	14393	25000	546800	20856	20000	1062790	35247	892531	28791	45000	61796	25164	812	23965	773	1700	1362	14511	468	13780	445	1000	837	23584	876	23787	899	1500	1244	1159619	37407	958079	30906	44700	65243
Apr-20	478754	15959	25000	561800	18727	20000	1003364	33446	870697	29023	45000	61796	28924	964	27041	901	1700	1362	15825	528	15315	511	1000	837	23574	853	23569	856	1500	1244	1060941	35365	917486	29115	44700	65243
May-20	372509	12018	25000	579400	18696	20000	951939	30711	805395	25980	45000	61796	27100	874	25745	830	1700	1362	12263	395	11567	376	1000	837	22775	715	22616	720	1500	1244	1013516	32694	864823	27898	44700	65243
Jun-20	381825	12728	25000	604900	20163	20000	1049100	34970	909567	30319	45000	61796	27100	903	25745	858	1700	1362	13438	448	13438	448	1000	837	22465	749	22465	749	1500	1244	1086825	36228	981625	32721	44700	65243
Jul-20	323624	10439	25000	604900	19519	20000	928724	29958	868407	28013	45000	63034	28965	935	27053	873	1700	1389	14438	466	13482	435	1000	849	22465	725	21661	699	1500	1282	995496	32113	930451	30015	44700	65536
Sep-20	402593	13420	25000	561800	18727	20000	1003364	33446	870697	29023	45000	63034	27222	907	25852	862	1700	1389	14255	475	13557	452	1000	849	21945	731	21945	731	1500	1282	1068833	35628	944742	29825	44700	65536
Sep-20	426513	14217	25000	561800	18727	20000	968019	32934	801427	26714	45000	63034	17222	957	17083	569	1700	1389	16255	542	14822	494	1000	849	21943	702	21943	680	1500	1282	1042535	34751	853718	28457	44700	65536
Oct-20	426513	13761	25000	561800	18122	20000	1003364	32367	868407	28013	45000	63034	27406	884	26824	865	1700	1389	16411	529	15988	516	1000	849	22984	906	22984	890	1500	1282	1072893	34606	899221	29000	44700	65536
Nov-20	436051	14535	25000	561800	18720	20000	1007551	33584	858312	28610	45000	63034	29522	984	28952	965	1700	1389	16441	548	15916	531	1000	849	23090	903	22890	930	1500	1282	1072904	35763	930990	31033	44700	65536
Dec-20	436390	14083	25000	561800	18122	20000	1048339	33849	893134	28824	45000	63034	31274	1009	30219	975	1700	1389	16424	530	15933	514	1000	849	23090	745	23090	745	1500	1282	1118181	36102	984892	31790	44700	65536
Jan-21	466306	14397	25000	617000	19908	20000	1063309	34300	927264	29912	45000	63034	29666	957	28714	926	1700	1389	18542	598	18118	584	1000	849	32586	1051	32722	1056	1500	1263	1144604	36923	1006208	32458	44700	65536
Feb-21	466306	16654	25000	603800	20369	20000	1059734	37848	983788	35134	45000	63034	31303	1118	30414	1086	1700	1389	16441	587	15895	568	1000	849	23090	1065	23090	1065	1500	1263	1064475	37996	1062999	37607	44700	65536
Mar-21	482400	14206	25000	539800	20639	20000	1062790	34845	975196	31478	45000	63034	31303	1010	30414	981	1700	1389	17695	571	16567	534	1000	849	23202	748	23202	807	1500	1263	1155600	37274	1041752	33788	44700	65536
May-21	474754	15319	25000	561800	18727	20000	1003364	33446	870697	29023	45000	63034	31303	1044	30408	981	1700	1389	16441	530	15916	513	1000	849	23202	748	23202	748	1500	1263	1124528	36275	1013514	32697	44700	65536
May-21	431870	13931	25000	606900	19642	20000	1004719	33573	913474	29987	45000	63034	27311	881	26078	841	1700	1389	14467	467	13653	441	1000	849	22107	713	21706	700	1500	1282	1105035	35646	974931	31449	44700	65536
Jun-21	443694	14231	25000	606900	20063	20000	1018349	33672	935196	30906	45000	64295	29066	969	28161	939	1700	1417	15842	528	15842	528	1000	867	21955	732	21955	732	1500	1282	1078225	35941	961873	32062	44700	67856
Jul-21	443994	14316	25000	585900	19616	20000	1029994	33532	925077	29841	45000	64295	35065	1131	30372	1164	1700	1417	12149	392	11102	358	1000	867	21657	699	19694	635	1500	1282	1108365	35754	991945	31998	44700	67856
Aug-21	443544	14311	25000	585900	18900	20000	1029444	34133	929897	30836	45000	64295	34917	1127	29814	962	1700	1417	14171	457	13719	443	1000	867	21657	699	20498	661	1500	1282	1113406	36916	1014683	33408	44700	67856
Sep-21	433524	14451	25000	604300	20143	20000	1037824	34594	936537	31218	45000	64295	30085	1003	28650	955	1700	1417	17284	576	15213	507	1000	867	22553	796	24220	806	1500	1282	1109146	36972	1004616	33487	44700	67856
Oct-21	443694	14315	25000	606900	20063	20000	1050244	33879	948954	30611	45000	64295	24406	949	23688	921	1700	1417	13454	478	13454	478	1000	867	24058	776	24058	776	1500	1282	1092927	35255	1072620	34601	44700	67856
Nov-21	403564	15452	25000	574500	19150	20000	1068064	35602	961960	32732	45000	64295	32732	1091	30609	1020	1700	1417	16150	538	13364	446	1000	867	26166	872	26166	872	1500	1282	1138164	37939	1048673	34956	44700	67856
Dec-21	443694	14315	25000	606900	19577	20000	1123599	36245	1007651	32118	45000	64295	34917	1126	29814	962	1700	1417	14822	478	14822	478	1000	867	26166	844	26166	844	1500	1282	1181761	42446	1135155	36618	44700	67856
Jan-22	580059	18712	25000	666000	21484	20000	1246059	40195	1089487	35145	45000	64295	35646	1150	34670	1118	1700	1417	20078	648	18896	610	1000	867	31538	1017	32634	1052	1500	1282	1333321	43010	1175987	37935	44700	67856
Feb-22	580059	20717	25000	629800	22493	20000	1208731	43180	1039557	37127	45000	64295	31923	1140	30659	1095	1700	1417	15883	567	15883	567	1000	867	27655	988	28469	1017	1500	1282	1189554	42488	1059932	37855	44700	67856
Mar-22	530419	17110	25000	719200	23200	20000	1249619	40310	1039557	33544	45000	64295	31923	1030	30659	992	1700	1417	16941	546	14451	466	1000	867	27199	877	28825	930	1500	1282	1325668	42763	1113892	35932	44700	67856
Apr-22	547950	18265	25000	552200	18407	20000	1210986	40362	1016536	34151	45000	64295	33626	1121	32202	1073	1700	1417	14485	483	14485	483	1000	867	28851	962	28851	962	1500	1282	1282727	42748	1093141	36438	44700	67856
May-22	542880	17512	25000	742000	23935	20000	1284880	41448	1104126	35617	45000	64295	32114	1036	30714	991	1700	1417	21854	705	12861	415	1000	867	23384	754	24102	777	1500	1282	1342232	43298	1146863	36996	44700	67856
Jun-22	579600	17960	25000	481700	16057	20000	1188438	39620	1038108	34603	45000	64295	27117	904	25226	841	1700	1417	15683	523	14599	487	1000	867	21487	716	21609	720	1500	1282	1088368	36129	1059693	35323	44700	67856
Jul-22	532672	17183	25000	611900	19739	20000	1144572	36922	944399	30464	45000	65581	27044	872	27275	880	1700	1446	13283	429	11349	366	1000	875	19356	624	21437	692	1500	1301	1204253	38847	1004460	32402	44200	69203
Aug-22	547950	20127	25000	611900	17442	20000	1159425	37885	986990	32026	45000	65581	28506	1053	26201	846	1700	1446	14485	467	14485	467	1000	875	19896	993	20098	975	1500	1301	1242254	40008	1013460	32708	44200	69203
Sep-22	505229	16841	25000	634300	21143	20000	1139529	37984	979345	32545	45000	65581	26371	879	26493	883	1700	1446	13331	444	11819	394	1000	875	21017	701	23428	781	1500	1301	1200248	40008	1041084	34703	44200	69203
Oct-22	579600	18696	25000	561800	18122	20000	1188438	38335	1038108	33488	45000	65581	27044	872	27275	880	1700	1446	15683	506	14599	471	1000	875	21487	693	21487	693	1500	1301	1205863	40873	1102691	36129	44200	69203
Nov-22	540261	18009	25000	654500	21817	20000	1194781	39825	1016636	33955	45000	65581	25910	864	26025	868	1700	1446	14961	497	16206	540	1000	875	21666	722	21967	1066	1500	1301	1264166	42139	1092834	36428	44200	69203
Dec-22	579600	18696	25000	561800	18122	20000	1188438	38335	1038108	33488	45000	65581	27044	872	27275	880	1700	1446	15683	506	14599	471	1000	875	21487	693	21487	693	1500	1301	1205863	40873	1102691	36129	44200	69203
Jan-23	516054	16647	25000	620900	20029	20000	1136954	36676	1119702	36103	45000	65581	23035	743	22842	737	1700	1446	18217	588	16812	542	1000	875	21911	707	21428	691	1500	1301	1255177	38877	1190324	38398	44200	69203
Feb-23	516054	18431	25000	561800	20063	20000	1076854	38459	1081138	38612	45000	65581	18508	643	17551	627	1700	1446	12991	464	12991	464	1000	875	21522	768	21518	768	1500	1301	975762	34849	1001901	35179	44200	69203
Mar-23	506457	16337	25000	533000	17194	20000	1039457	33531	1094430	35304	45000	65581	22498	726	22863	738	1700	1446	11423	368	14606	471	1000	875	24205	781	27286	880	1500	1301	1097583	35406	1159205	37394	44200	69203
May-23	451690	14570	25000	561800	18122	20000	926560	29889	991022	31936	45000	65581	18227	642	19077	674	1700	1446	13305	516	13305	471	1000	875	21655	699	21655	699	1500	1301	944998	32833	1056084	35203	44200	69203
May-23	354798	11531	25000	657900	21210	20000	1014958	32741	1032071	33293	45000	65581	17240	556	16915	545	1700	1446	13510	436	12605	407	1000	875	20634	666	23155	746	1500	1301	1066342	34398	1084696	34990	44200	69203
Jun-23	414171	13806	25000	578400	19012	20000	992572	33019	1073596	35787	45000	65581	23143	778	21739	725	1700	1446	12911	430	11522	384	1000	875	22334	744	24013	800	1500	1301	1043160	34772	1028854	34295	44200	69203

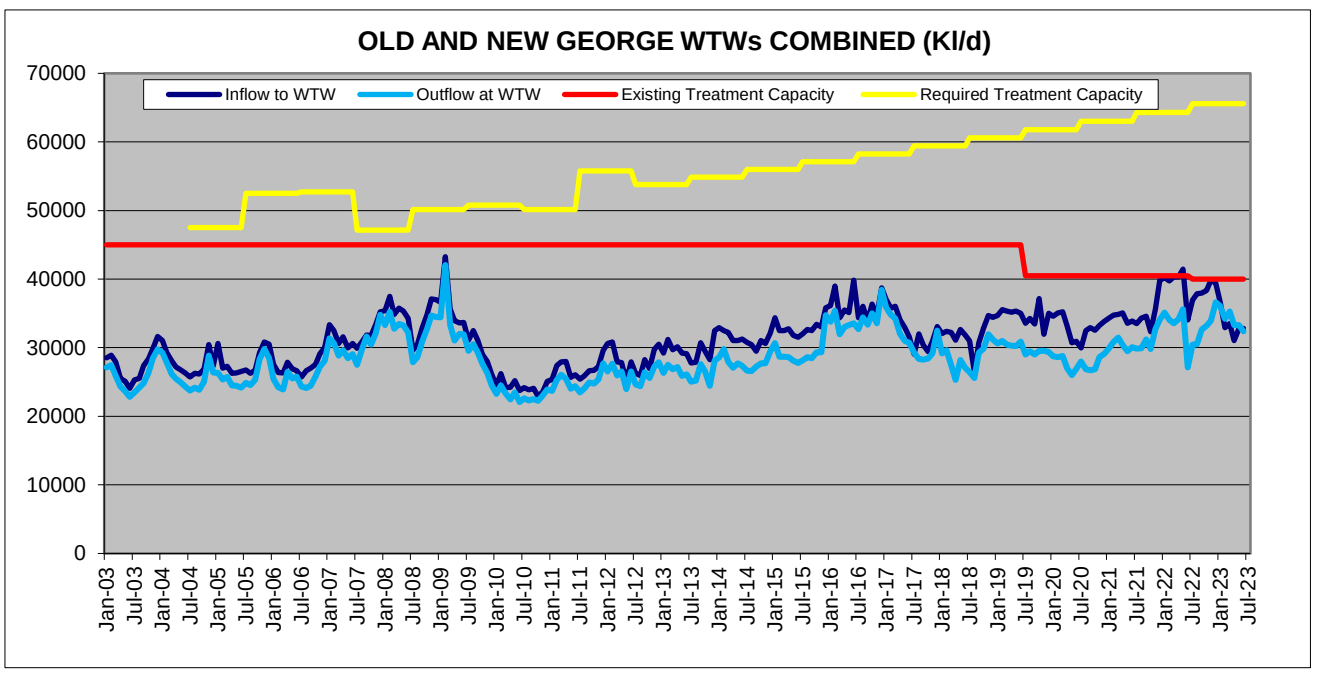
ANNUAL TOTALS

Year	Old George WTWs			New George WTWs			Old and New George WTWs Combined						Ebb & Flow WTWs				Haarlem WTW				Uniondale WTW				Total WTWs				
	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Existing Capacity	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 2.0% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Existing Capacity	Required Capacity (1.5 x AADD of 10yr projected demand @ 1.5% on 2022/2023 demand)	In-Flow at WTW		Out-Flow at WTW		Capacity	Required Capacity
	kl	kl/d	kl/d	kl	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	kl	kl/d	kl	kl/d	kl/d	kl/d	ML	kl/d	ML	kl/d	kl/d	kl/d
2003/2004	1600879	4386	25000	8666534	23744	20000	10267413	28130	9604039	26312	45000	47496	3638306	997	4548884	1246	1700	1645													5298831	14493	4995211	13686	49100	49140
2004/2005	1680840	4605	25000	8972788	23756	20000	9941837	27238	9200726	25207	45000	47496	4176557	1144	3765511	1015	1700	1645													10359494	28382	8971279	26223	46700	49140
2005/2006	1579015	4326	25000	8523731	23353	20000	10102746	27679	9514180	26066	45000	52527	4404840	1208	3945101	1081	1700	1468													10543586	28887	9908696	27147	46700	53995
2006/2007	1413996	6339	25000	8495924	23204	20000	10783420	29544	10092557	27652	45000	52709	2994076	738	2649497	725	1700	1700													11050992	30282	10307454	28377	46700	54119
2007/2008	3669228	10053	25000	8711106	23866	20000	12380334	33919	11779795	32273	45000	47149	2869513	786	2696698	739	1700	1345													12667247	34705	12049496	33012	46700	48493
2008/2009	3858268	10571	25000	8852338	24256	20000	12710606	34824	11963550	32777	45000	50132	3303703	1023	3511551	962	1700	1535													13043359	35848	12314703	33739	46700	51665
2009/2010	2061600	5648	25000	7852510	21514	20000	9914110	27162	9340196	25590	45000	50797	4073314	1116	3828755	1049	1700	1392													10321424	28278	9723071	26639	46700	52189
2010/2011	1295711	3550	25000	9243918	25326	20000	10539629	28877	9681888	26536	45000	50156	3356050	919	3154464	864	1700	1406													10795511	29245	9997354	27060	46500	51606
2011/2012	2125700	5824	25000	7991400	21894	20000	10117100	27718	9372645	25678	45000	55772	2644699	725	2493313	683	1700	1427	99241	272	89405	245	1000	812	22510	617	20648	566	1500	1228	10705913	29331	9917846	27172	49200	59240
2012/2013	2631200	7208	25000	7926868	21318	20000	10525817	28838	9695837	26524	45000	55772	2959599	811	2814066	771	1700	1186	117250

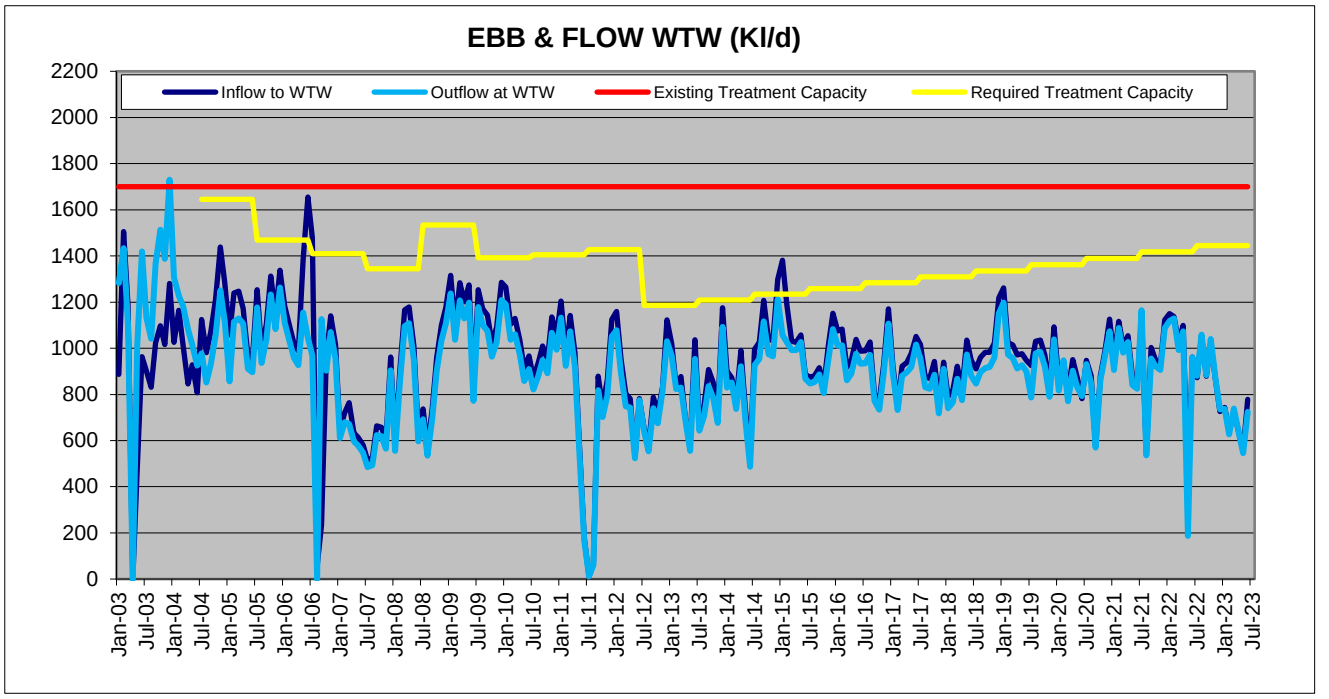
WTW FLOWS AND CAPACITIES

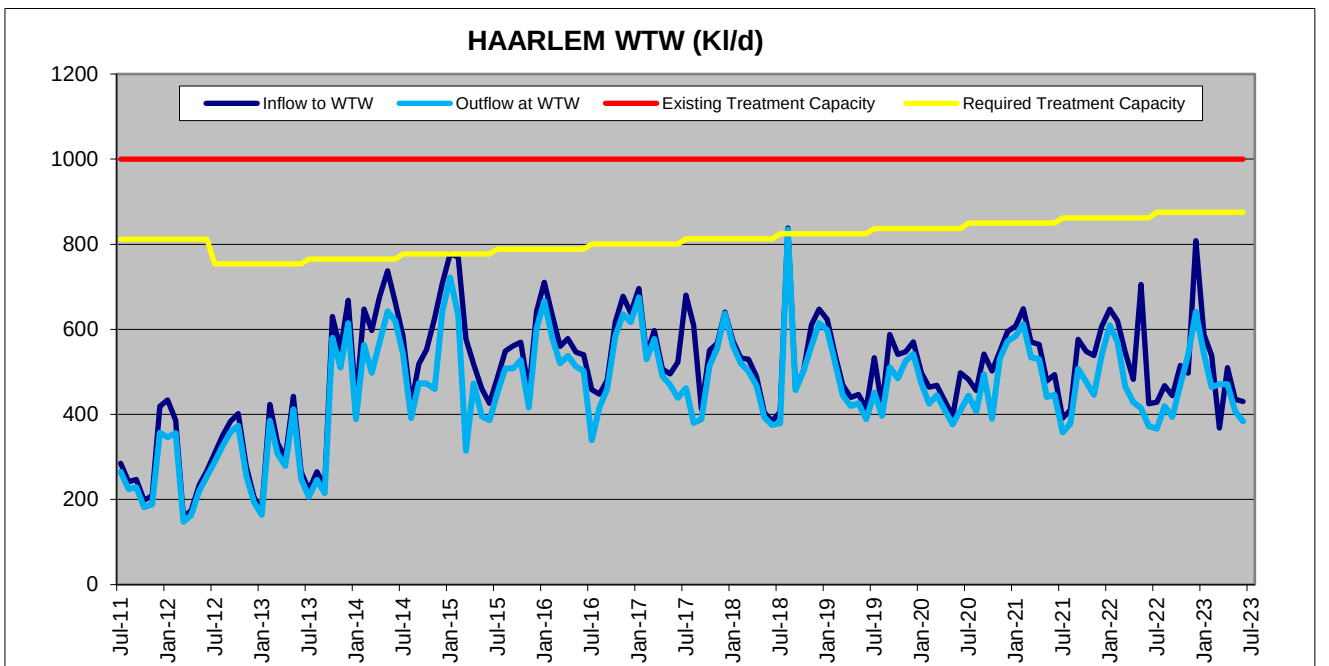


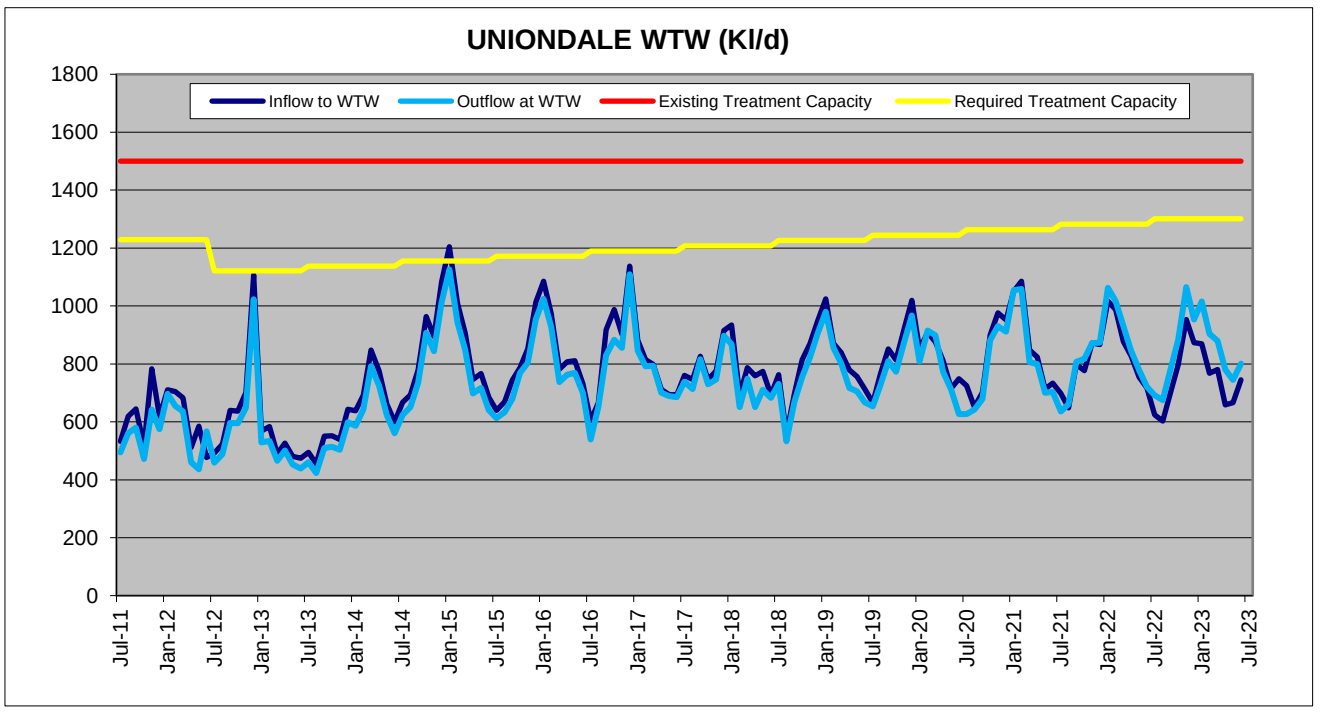




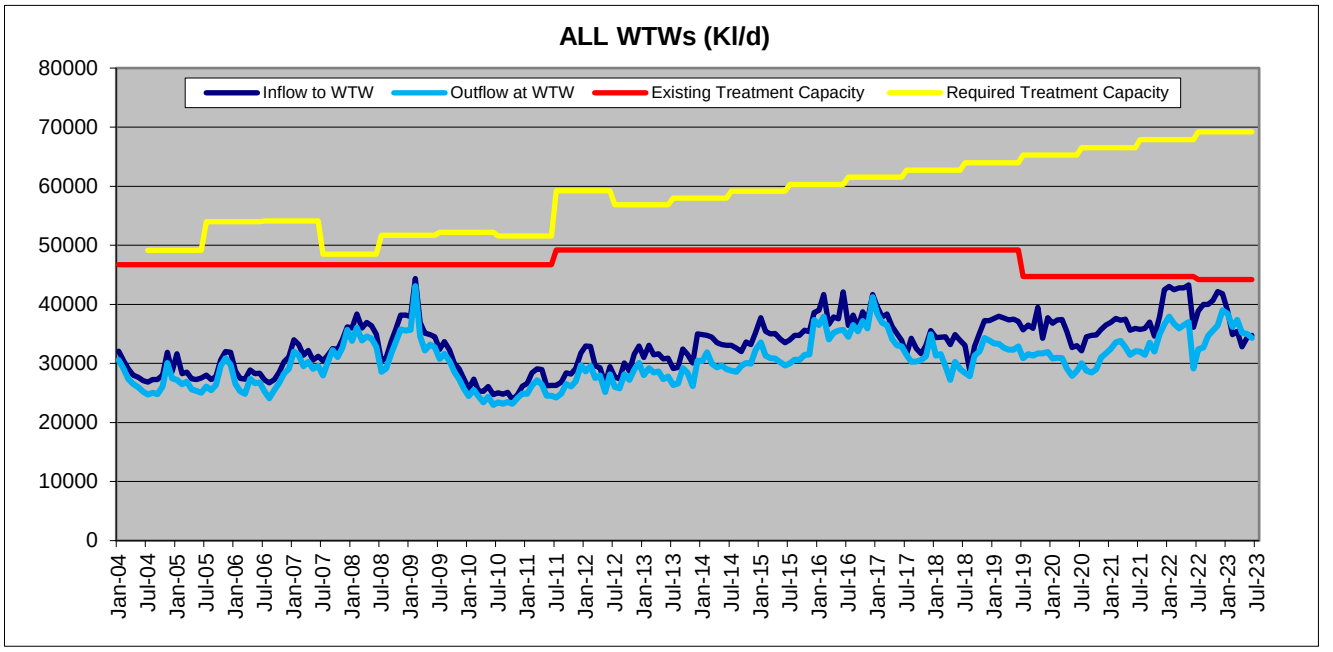
WTW FLOWS AND CAPACITIES







WTW FLOWS AND CAPACITIES



MUNICIPAL SCORECARD FOR ASSESSING THE POTENTIAL FOR WC/WDM EFFORTS IN MUNICIPALITIES: GEORGE MUNICIPALITY

1. Development of Standard Water Balance	WSA has developed reliable water balance and results indicate UAW/NRW at less than 20%	4
	WSA has developed reliable water balance and results indicate UAW/NRW at 20% to 40%	3
	WSA has developed reliable water balance and results indicate UAW/NRW at more than 40%	2
	WSA has no water balance. Is currently developing one	1
	WSA has no water balance	0

2. Pressurised Supply to all consumers 100% of time	WSA maintains a pressurised supply to all areas within the water distribution network all of the time at a minimum of 20m pressure	4
	WSA maintains a pressurised supply to all areas within the water distribution network however pressure drops below 10m in certain areas	3
	Small isolated sections of the network experience intermittent supply	2
	Many sections of the network experience intermittent supply	1
	The entire network experiences intermittent supply	0

3. Residential Metering System	More than 98% of all connections are metered and billed.	4
	75% to 98% of all connections are metered and billed	3
	50 - 75% of connections are metered and billed	2
	Less than 50% of connections are metered and billed	1
	No metering takes place	0

4. Non Residential Metering System (Commercial, Industrial and Institutional)	More than 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use	4
	75% to 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use	3
	50 - 75% of non-residential connections, including fire supply connections, are metered and billed based on metered	2
	Less than 50% of non-residential connections, including fire supply connections, are metered and billed based on metered use	1
	No non—residential metering takes place	0

5. Effective Billing System including Informative Billing	WSA produces informative billing to all customers based on meter readings	4
	WSA produces informative billing to most customers based on meter readings	3
	WSA produces informative billing to only some customers based on meter readings	2
	WSA has an uninformative billing system in place	1
	WSA has no billing	0

6. Network (Leakage) Complaints System	Efficient reporting system in place (90% of reported leaks are repaired within 24 hours)	4
	Efficient reporting system in place (90% of reported leaks are repaired within 48 hours)	3
	Leakage reporting system in place response times need to be improved	2
	Leakage reporting system in place but few if any field response teams to undertake repairs	1
	No leakage reporting system in place and no plans to create one	0

7. Billing and Metering Complaints System	Efficient reporting system for metering and billing problems in place (90% dealt with within14 days)	4
	Efficient reporting system for metering and billing problems in place (90% dealt with within one month)	3
	Metering and billing problem reporting system in place response times need to be improved	2
	Metering and billing problem reporting system in place but very poor response time with many problems never resolved	1
	No Metering and billing problem reporting system in place	0

8. Asset Register for Water Reticulation System	WSA has a comprehensive and accurate asset register in place which is available digitally	4
	WSA has a partially completed accurate asset register in place	3
	WSA has a poor asset register in place	2
	SA is in the process of developing an asset register	1
	WSA has no asset register in place and no immediate intention of generating an asset register	0

9. Asset Management - Capital Works	2% or more of the value of the water network is invested annually into new capital works related to the existing	4
	1% - 2% of the value of the water network is invested annually into new capital works related to the existing infrastructure	3
	Less than 1% of the value of the water network is invested annually into new capital works related to the existing infrastructure	2
	No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on new	1
	No estimate of asset value of water supply system is available and WSA feels that insufficient budget is spent on new Capital Works	0

10. Asset Management - Operations and Maintenance	2% or more of the value of the water network is invested annually into the maintenance of the existing infrastructure	4
	1% - 2% of the value of the water network is invested annually into the maintenance of the existing infrastructure	3
	Less than 1% of the value of the water network is invested annually into the maintenance of the existing infrastructure	2
	No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on operations and maintenance	1
	No estimate of asset value of water supply system is available and WSA feels that insufficient budget is spent on operations and maintenance	0

11. Dedicated WDM support	Efficient WDM Section in place with sufficient resources	4
	WDM section in place requires some resources and capacity building	3
	WDM section in place. Major resources and capacity building required	2
	No WDM section currently in place, intention to create WDM section	1
	No WDM Section and no intention to create WDM section	0

12. Active Leakage Control	Active leakage detection and repair undertaken continuously with average sweep time of 12 months or less	4
	Active leakage detection and repair undertaken continuously with average sweep time of 48 months	3
	Active leakage detection and repair is undertaken on an add-hoc basis	2
	No active leakage detection is currently undertaken however the WSA intends to initiate such measures	1
	No active leakage detection is undertaken and the WSA has no intention to conduct such measures	0

13. Effective Sectorisation	Reticulation network has been sectorised and is checked regularly to maintain discrete zones	4
	Reticulation network has been sectorised but is not checked regularly to ensure discrete zones	3
	Only portions of the reticulation network have been sectorised	2
	Few if any zones have been created but plans are in place to sectorise the system	1
	No sectorisation has been undertaken and no plans are in place to implement such measures	0

MUNICIPAL SCORECARD FOR ASSESSING THE POTENTIAL FOR WC/WDM EFFORTS IN MUNICIPALITIES: GEORGE MUNICIPALITY

14. Effective Bulk Meter Management	All bulk water sources to the WSA are metered by the WSA using some form of check metering (either permanent or temporary)	4
	All bulk water sources to the WSA are metered by the Bulk water supplier or by the WSA	3
	Few bulk meters are operational	2
	No Bulk metering in place, however, WSA has plans to install bulk meters	1
	No Bulk metering in place and no plans for such meters have been made	0
15. Effective Zone Meter Management and Assessment of Minimum Night Flows	All inlet points to discrete zones are metered and accurate with Minimum Night Flows logged and analysed on a regular basis	4
	All inlet points to discrete zones are metered and accurate but no Minimum Night Flow analyses are undertaken	3
	All inlet points to discrete zones are metered but many are broken or considered to be inaccurate	2
	Zone inputs are currently not metered although the WSA has planned to install meters on all zone inlets	1
	No accurate zone metering is in place and there are no plans to introduce such measures	0
16. Pressure Management and Maintenance of Pressure Reducing Valves	Reticulation is comprehensively sectorised into pressure zones which are all discrete. All PRV's are maintained under maintenance schedule	4
	Reticulation is comprehensively sectorised into pressure zones which are all discrete. PRV's are only maintained when problems become apparent.	3
	Reticulation is sectorised in pressure zones but the zones are not verified and little or no maintenance is undertaken on the PRVs	2
	WSA intends to introduce pressure zones and the use of PRVs to manage system pressures.	1
	No Discrete pressure zones and no PRV maintenance	0
17. As-Built Drawings of Bulk and Reticulation Infrastructure	Accurate as-built drawings for all reticulation are available digitally	4
	As-build drawings available digitally for the majority of the network and available in hardcopy for the remainder of the network	3
	A mixture of digital and hard copy as-built drawings available for the majority of the network but many problems are known to exist with the quality of the da	2
	Only some hard copy as-built drawings are available for portions of the network	1
	No as-built drawings available	0
18. Schematic Layout of Water Infrastructure	An up-to date and detailed schematic of the whole bulk reticulation network is available showing all bulk mains, pumps, reservoirs, meters and control valve	4
	A detailed schematic of the bulk reticulation network is available but is known to be outdated and/or inaccurate.	3
	Only a rough schematic of the bulk reticulation network is available which is known to be inaccurate and/or outdated	2
	No schematic of the bulk reticulation is available although the WSA is planning to develop such a schematic.	1
	No schematic of the bulk reticulation is available and the WSA has no plans to develop such a schematic.	0
19. Regulations and Bylaws	Regulations and Bylaws are in place which address WDM issues and some form of enforcement is undertaken	4
	Regulations and Bylaws are in place which address WDM issues but are not enforced	3
	Regulations and Bylaws are in place but do not address WDM issues	2
	There are no Bylaws in place but WSA is intending to introduce such measures	1
	There are no Bylaws in place and WSA has no plans to introduce then·	0
20. Tariffs	WSA has rising block tariffs in place that encourage water use efficiency	4
	WSA has rising block tariffs in place but they do not encourage water use efficiency sufficiently	3
	WSA has single water tariff in place	2
	WSA has a declining block tariff in place	1
	WSA does not know what tariff structure is in place	0
21. Technical Support to Customers	The WSA actively engages with customers and offers technical support on WDM to both domestic as well as commercial/industrial customers	4
	The WSA offers technical support on WDM to large consumers on a pro-active basis	3
	The WSA only offers technical support on WDM on a reactive basis	2
	The WSA currently offers no technical support but plans to introduce a support mechanism	1
	The WSA has no plans to offer technical support on WDM measures to any customers	0
22. Removal of Unlawful Connections	The WSA actively monitors and removes all unlawful connections	4
	The WSA selectively monitors and removes unlawful connections	3
	The WSA monitors unlawful connections but has no policy for removal	2
	The WSA plans to introduce measures to tackle unlawful connections	1
	The WSA has no plans to deal with illegal connections	0
23. Community Awareness and Education Programmes	WSA is actively involved in conducting workshops on water conservation within the communities with a dedicated team	4
	WSA is involved in conducting workshops on water conservation within the communities however no dedicated team exists	3
	WSA has very little involvement with workshops on water conservation within the communities	2
	WSA currently does not conduct workshops on water conservation within the communities, however these interventions are proposed	1
	WSA currently does not conduct workshops on water conservation within the communities	0
24. Schools Awareness and Education Programmes	WSA is actively involved in conducting workshops on water conservation within the schools with a dedicated team	4
	WSA is involved in conducting workshops on water conservation within the schools however no dedicated team exists	3
	WSA has very little involvement with workshops on water conservation within the schools	2
	WSA currently does not conduct workshops on water conservation within the schools, however these interventions are proposed	1
	WSA currently does not conduct workshops on water conservation within the schools	0
25. Newspaper radio articles plus posters and leaflets for distribution	WSA runs regular adds in newspapers and/or radio and has library of posters and leaflets for public distribution	4
	WSA runs occasional adds in newspapers and/or radio and has library of posters and leaflets for public distribution	3
	WSA has library of posters and leaflets for public distribution but does not advertise in newspapers or radio	2
	WSA has some leaflets and/or posters and intends to strengthen its capacity to promote WC/WDM in the community	1
	WSA does not advertise in newspapers or radio and has no posters or leaflets on WC/WDM	0
TOTAL		78

SUMMARY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

P09196

S1. SYSTEM NAME AND CONTACT DETAILS

Name of Water Undertaking		George Municipality
Name of Water Supply System		George / Wilderness
Contact Details:	Name	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

S2. Performance Indicators of Water Loss

Viewpoint	Level	Parameter	Typical Range Excellent	Good	Poor	Actual PI	Units
Operations management of distribution system at current pressure	**Basic**	% of year system is pressurised	100	100	<100	100	%
		Current Annual Real Losses (CARL) (when system is pressurised - see note 2)	30 to 100	100 to 200	>200	132	Litres/connection/day
	Detailed	Unavoidable Annual Real Losses (UARL) (see note 3)	n/a	n/a	n/a	58	Litres/connection/day
		Consumption	n/a	n/a	n/a	720	Litres/connection/day
		Infrastructure Leakage Index (ILI) (= CARL/UARL : see note 4)	1	2	>3.0	2.3	non dimensional
Financial management aspects of water losses	**Basic**	Volume of non-revenue water as a% of system input volume (see note 5)	<10%	20%	30%	30	%
	Detailed	Value of non-revenue water as a % of annual cost of running the system (see note 6)	<5%	10%	15%	20	%

Notes:

Note1: taken from data in "AQUA" article, December 1999 or estimated by WRP

Note 2: takes account of % of time system is pressurised, but not system pressure, density of connections or customet meter location

Note 3: takes account of density of connections and customer meter location at current pressure

Note 4: measures overall efficiency of management of distribution system at current operating pressure

Note 5: strongly influenced by average consumption per service connection

Note 6: Allows different values of Rand/m3 for different components of non-revenue water

S3. Key Operating Parameters which influence Unavoidable Annual Real Losses (UARL)

Variable	Typical Range Low	Medium	High	Actual PI	Units
Average Operating Pressure	30	45	100	48	Metres
Density of connections	20	45	120	43	per km of mains

4. Key Components of Annual System Input Volume

Component	m3/year	m3/connection/day	% of System Input Volume
Water Exported		not applicable	
Authorised Consumption excluding exports	10294154	0.72	82.2
Apparent Losses	333328	0.02	2.7
Actual Consumption excluding exports	10627482	0.74	84.9
Real Losses	1888858	0.13	15.1
System Input Volume	12516340	0.88	100.0

DATA ENTRY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

Note: Note: An example has been included to assist you in completing this data sheet. The example input data can be seen in the pale blue shaded areas. Your input data should appear in the pale yellow shaded areas. The light green shaded areas are protected calculation fields and nothing can be entered in these fields.
Use the units as shown. If you have to use other units; you have to change the appropriate cells.

D1. GENERAL

Name of Water Undertaking		George Municipality
Name of Water Supply System		George / Wilderness
Contact Details:	**Name**	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

D2. SYSTEM DATA

Input Description	Variable	Example Data	Actual Data	Units	
Length of Mains (Transmission + Distribution)	Lm	1500	909	km	
Number of Service Connections	Ns	60000	39158	Number	See Notes 1 & 2
Density of Service Connections (per km of mains)	Ns/Lm	40	43	Per km	
Percentage of time system is pressurised during year	T	100	100	%	See Note 3
Average operating pressure when system pressurised	P	45	48	metres	See Note 4
Population served by the supply system	Pop	100000	223254	Number	

Note 1: The number of service connections is not always the same as the number of meters or billed accounts. For South African conditions, however, you can use the total of the number of metered accounts plus the estimated number of unmetered connections

Note 2: In South Africa customer meters are usually located close to the street/stand boundary. If this is not the case for your system, then add a note here.

Average number of consumers from July 2022 to June 2023 = 38 297 (Treasury) + Number of standpipes in informal areas = 412 + Number of communal flush toilet facilities = 449. Total therefore 39 158

Note 3: Use T in % eg. If T = 80%, use 80 and not 0.8

Note 4: If you do not have an accurate figure, please make a best estimate and provide brief details of how you derived it.

Calculated from 2021 GLS wadiso water model data (Pipe Length, Average Dynamic Head and Average Static Head)

D3. UNAVOIDABLE ANNUAL REAL LOSSES (UARL)

Details	Calculation	Example Result	Actual Data	Units
On mains	$18 \times Lm \times P \times 365 \times T/10^8$	443	285	10^3 m^3/yr
On Service Connections	$0.8 \times Ns \times P \times 365 \times T/10^8$	788	546	10^3 m^3/yr
Total Volume of UARL		**1232**	**831**	10^3 m^3/yr

UARL in litres/service conn./day when the system is pressurised	Annual Volume of UARL x 10^6 / (Ns x 365 x T/100)	**56**	**58**	Litres/ conn./day

D4. ANNUAL WATER BALANCE DATA

D4a. Data Period

		Example Data	Actual Data
12-MONTH PERIOD FOR WHICH DATA APPLIES	**Start Date**	April 1, 1998	July 1, 2022
	End Date	March 31, 1999	June 30, 2023

D4b. System Input Volume

Water Supplied	**Example Data**					**Actual Data**				
	Metered 10^3 m^3/yr	**Correction to Source Meter data**		**Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**	**Metered 10^3 m^3/yr**	**Correction to Source Meter data**		**Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**
		+/- %	**10^3 m^3/yr**				**+/- %**	**10^3 m^3/yr**		
From Own Sources:	36000	2.00%	720		36720	12516				12516
From Other Suppliers:	1000			280	1280					
Total:	37000		720	280	38000	**12516**				**12516**

D4c. Components of Authorised Consumption

Components of Authorised Consumption	**Example Data**					**Actual Data**				
	Billed Metered 10^3 m^3/yr	**Billed Unmetered 10^3 m^3/yr**	**Unbilled Metered 10^3 m^3/yr**	**Unbilled Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**	**Billed Metered 10^3 m^3/yr**	**Billed Unmetered 10^3 m^3/yr**	**Unbilled Metered 10^3 m^3/yr**	**Unbilled Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**
Water Exported:	1500				1500					
Households:	24500	500			25000	5711	381		580	6673
Non-households:	6900	100			7000	1448				1448
Standpipes:		500	10		510				876	876
Firefighting:				100	100				13	13
Mains Flushing:				100	100				13	13
Building water:	1040				1040					
Other (specify): Industrial						672				672
Other (specify): "Other"						600				600
TOTALS:	33940	1100	10	200	35250	**8431**	**381**		**1482**	**10294**

D4d. Components of Water Losses

Details	**Example Result**	**Actual Result**	**Units**
Water Losses = System Input – Authorised Consumption	2750	2222	10^3 m^3/yr
Percentage of Total Losses estimated to represent the Apparent Losses	20	15	%
Apparent Losses	550	333	10^3 m^3/yr

Annual Real Losses (ARL) = Water Losses – Apparent Losses	**2200**	**1889**	10^3 m^3/yr

D5. SELECTED OPERATIONAL PERFORMANCE INDICATORS

D5a. Current Annual Real Losses per Connection (CARL) at Current Pressures

Details	Calculation	Example Result	Actual Result	Units
CARL is expressed in Litres/service connection/day, when system is pressurised	ARL x 10^6 / (Ns x T/100 x 365)	**100**	**132**	Litres /conn./day
Consumption in litres/conn/day		**1610**	**720**	Litres /conn./day

D5b. Infrastructure Leakage Index (ILI)

Details	Calculation	Example Result	Actual Result
ILI is the ratio of Current Annual Real Losses (CARL) to Unavoidable Annual Real Losses	CARL / UARL	**1.79**	**2.27**

D5c. Non-Revenue Water as a % by Volume of System Input

Description of Unbilled Items	Example Result			Actual Result		
	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input
Unbilled Consumption	210	38000	0.55	1482	12516	11.84
Apparent Losses:	550	38000	1.45	333	12516	2.66
Real Losses:	2200	38000	5.79	1889	12516	15.09
Total Unbilled:	**2960**	**38000**	**7.79**	**3704**	**12516**	**29.59**

D6. SELECTED FINANCIAL PERFORMANCE INDICATORS

D6a. Local Valuation of Real and Apparent Losses

Details	Example Result	Actual Result	Units
Unit Value of Real Losses (eg bulk purchase price)	0.15	3.38	R /m^3
Unit Value of Apparent Losses (eg selling price)	2.70	22.83	R /m^3

D6b. Annual Cost of Running System

Details	Example Cost	Actual Cost	Units
Annual Cost of running system in 1000's of Rand per year	45000	238920	10^3 R/year

D6c. Non-Revenue Water as % by Value of Cost of Running System

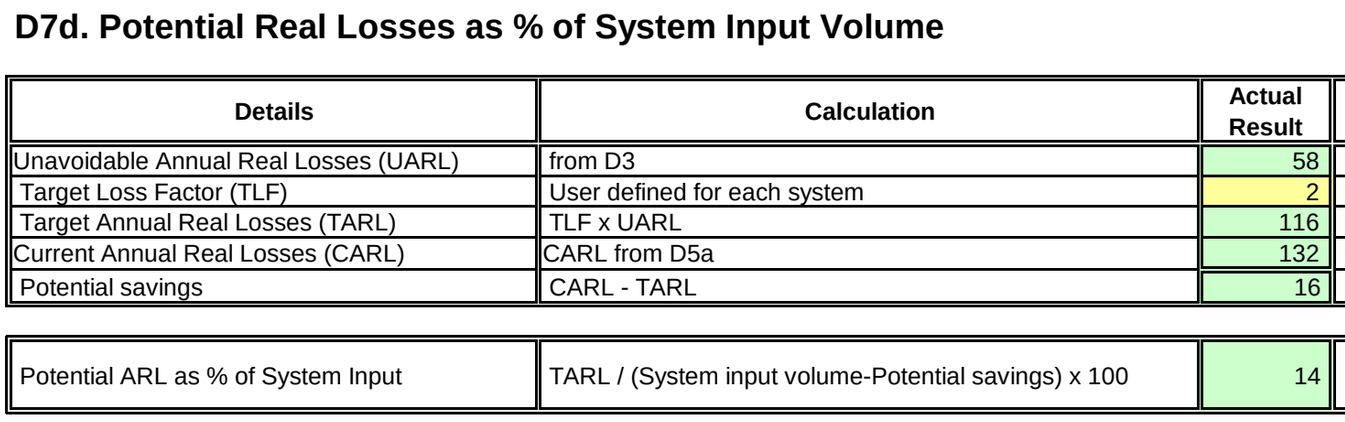
Description of Unbilled Items	Example Result				Actual Result			
	Volume 10^3 m^3/yr	Unit Value R /m^3	Value 10^3 R/year	% of Annual Running Costs Costs	Volume 10^3 m^3/yr	Unit Value (R /m^3)	Value 10^3 R/year	% of Annual Running Costs Costs
Unbilled Consumption	210	2.70	567	1.26	1482	22.83	33825	14.16
Apparent Losses:	550	2.70	1485	3.30	333	22.83	7610	3.19
Real Losses:	2200	0.15	330	0.73	1889	3.38	6384	2.67
Total Unbilled:	2960		**2382**	**5.29**	3704		47819	**20.01**

D7. RELATIONSHIP BETWEEN REAL LOSSES EXPRESSED AS % OF SYSTEM INPUT

D7a. Real losses curve definition

Curve Definition					
Consumption litres/serv conn/day	Real losses in litres/service connection/day				
	50	100	200	500	1000
100	33.3	50.0	66.7	83.3	90.9
250	16.7	28.6	44.4	66.7	80.0
500	9.1	16.7	28.6	50.0	66.7
1000	4.8	9.1	16.7	33.3	50.0
2000	2.4	4.8	9.1	20.0	33.3
3000	1.6	3.2	6.3	14.3	25.0
5000	1.0	2.0	3.8	9.1	16.7
10000	0.5	1.0	2.0	4.8	9.1

D7b. Components of water balance in litres/service connection/day (Actual Results)



D7c. Current Real Losses as % of System Input Volume

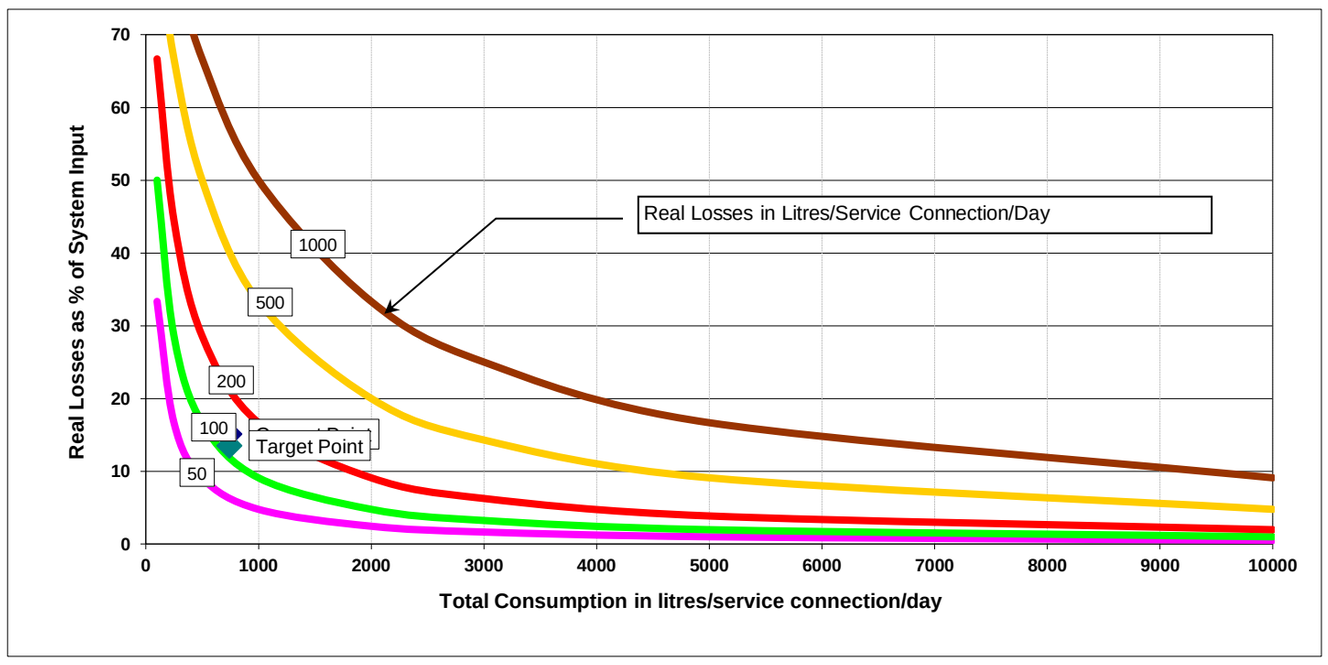
Details	Calculation	Actual Result	Units
System Input Volume	from D7b	876	Litres/conn/day
Total Consumption	from D7b	744	Litres/conn/day
Annual Real Losses	from D7b	132	Litres/conn/day

ARL as % of System Input	ARL / System input volume x 100	15	%

D7d. Potential Real Losses as % of System Input Volume

Details	Calculation	Actual Result	Units
Unavoidable Annual Real Losses (UARL)	from D3	58	Litres/conn/day
Target Loss Factor (TLF)	User defined for each system	2	Dimensionless
Target Annual Real Losses (TARL)	TLF x UARL	116	Litres/conn/day
Current Annual Real Losses (CARL)	CARL from D5a	132	Litres/conn/day
Potential savings	CARL - TARL	16	Litres/conn/day
Potential ARL as % of System Input	TARL / (System input volume-Potential savings) x 100	14	%

D7e. Real Losses as a % of System Input Volume versus Consumption in litres/service connection/day, for different values of Real Losses in litres/service connection/day



SUMMARY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

P09196

S1. SYSTEM NAME AND CONTACT DETAILS

Name of Water Undertaking		George Municipality
Name of Water Supply System		Haarlem
Contact Details:	Name	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

S2. Performance Indicators of Water Loss

Viewpoint	Level	Parameter	Typical Range Excellent	Good	Poor	Actual PI	Units
Operations management of distribution system at current pressure	**Basic**	% of year system is pressurised	100	100	<100	100	%
		Current Annual Real Losses (CARL) (when system is pressurised - see note 2)	30 to 100	100 to 200	>200	307	Litres/connection/day
	Detailed	Unavoidable Annual Real Losses (UARL) (see note 3)	n/a	n/a	n/a	49	Litres/connection/day
		Consumption	n/a	n/a	n/a	532	Litres/connection/day
		Infrastructure Leakage Index (ILI) (= CARL/UARL : see note 4)	1	2	>3.0	6.3	non dimensional
Financial management aspects of water losses	**Basic**	Volume of non-revenue water as a% of system input volume (see note 5)	<10%	20%	30%	47	%
	Detailed	Value of non-revenue water as a % of annual cost of running the system (see note 6)	<5%	10%	15%	13	%

Notes:

Note1: taken from data in "AQUA" article, December 1999 or estimated by WRP

Note 2: takes account of % of time system is pressurised, but not system pressure, density of connections or customet meter location

Note 3: takes account of density of connections and customer meter location at current pressure

Note 4: measures overall efficiency of management of distribution system at current operating pressure

Note 5: strongly influenced by average consumption per service connection

Note 6: Allows different values of Rand/m3 for different components of non-revenue water

S3. Key Operating Parameters which influence Unavoidable Annual Real Losses (UARL)

Variable	Typical Range Low	Medium	High	Actual PI	Units
Average Operating Pressure	30	45	100	28	Metres
Density of connections	20	45	120	19	per km of mains

4. Key Components of Annual System Input Volume

Component	m3/year	m3/connection/day	% of System Input Volume
Water Exported		not applicable	
Authorised Consumption excluding exports	101022	0.53	59.6
Apparent Losses	10272	0.05	6.1
Actual Consumption excluding exports	111294	0.59	65.7
Real Losses	58208	0.31	34.3
System Input Volume	169502	0.89	100.0

DATA ENTRY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

Note: Note: An example has been included to assist you in completing this data sheet. The example input data can be seen in the pale blue shaded areas. Your input data should appear in the pale yellow shaded areas. The light green shaded areas are protected calculation fields and nothing can be entered in these fields.
Use the units as shown. If you have to use other units; you have to change the appropriate cells.

D1. GENERAL

Name of Water Undertaking	George Municipality	
Name of Water Supply System	Haarlem	
Contact Details:	**Name**	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

D2. SYSTEM DATA

Input Description	Variable	Example Data	Actual Data	Units	
Length of Mains (Transmission + Distribution)	Lm	1500	28	km	
Number of Service Connections	Ns	60000	520	Number	See Notes 1 & 2
Density of Service Connections (per km of mains)	Ns/Lm	40	19	Per km	
Percentage of time system is pressurised during year	T	100	100	%	See Note 3
Average operating pressure when system pressurised	P	45	28	metres	See Note 4
Population served by the supply system	Pop	100000	2651	Number	

Note 1: The number of service connections is not always the same as the number of meters or billed accounts. For South African conditions, however, you can use the total of the number of metered accounts plus the estimated number of unmetered connections

Note 2: In South Africa customer meters are usually located close to the street/stand boundary. If this is not the case for your system, then add a note here.

Average number of consumers from July 2022 to June 2023 = 516 (Treasury) + Number of communal flush toilet facilities = 4. Total therefore 520.

Note 3: Use T in % eg. If T = 80%, use 80 and not 0.8

Note 4: If you do not have an accurate figure, please make a best estimate and provide brief details of how you derived it.

Calculated from 2021 GLS wadiso water model data (Pipe Length, Average Dynamic Head and Average Static Head)

D3. UNAVOIDABLE ANNUAL REAL LOSSES (UARL)

Details	Calculation	Example Result	Actual Data	Units
On mains	$18 \times Lm \times P \times 365 \times T/10^8$	443	5	10^3 m^3/yr
On Service Connections	$0.8 \times Ns \times P \times 365 \times T/10^8$	788	4	10^3 m^3/yr
Total Volume of UARL		**1232**	**9**	10^3 m^3/yr

UARL in litres/service conn./day when the system is pressurised	Annual Volume of UARL x 10^6 / (Ns x 365 x T/100)	**56**	**49**	Litres/ conn./day

D4. ANNUAL WATER BALANCE DATA

D4a. Data Period

		Example Data	Actual Data
12-MONTH PERIOD FOR WHICH DATA APPLIES	**Start Date**	April 1, 1998	July 1, 2022
	End Date	March 31, 1999	June 30, 2023

D4b. System Input Volume

Water Supplied	Example Data					Actual Data				
	Metered 10^3 m^3/yr	Correction to Source Meter data		Unmetered 10^3 m^3/yr	Total 10^3 m^3/yr	Metered 10^3 m^3/yr	Correction to Source Meter data		Unmetered 10^3 m^3/yr	Total 10^3 m^3/yr
		+/- %	10^3 m^3/yr				+/- %	10^3 m^3/yr		
From Own Sources:	36000	2.00%	720		36720					
From Other Suppliers:	1000			280	1280	170				170
Total:	37000		720	280	38000	**170**				**170**

D4c. Components of Authorised Consumption

Components of Authorised Consumption	Example Data					Actual Data				
	Billed Metered 10^3 m^3/yr	Billed Unmetered 10^3 m^3/yr	Unbilled Metered 10^3 m^3/yr	Unbilled Unmetered 10^3 m^3/yr	Total 10^3 m^3/yr	Billed Metered 10^3 m^3/yr	Billed Unmetered 10^3 m^3/yr	Unbilled Metered 10^3 m^3/yr	Unbilled Unmetered 10^3 m^3/yr	Total 10^3 m^3/yr
Water Exported:	1500				1500					
Households:	24500	500			25000	87	1		10	98
Non-households:	6900	100			7000	0				0
Standpipes:		500	10		510				1	1
Firefighting:				100	100				0	0
Mains Flushing:				100	100				0	0
Building water:	1040				1040					
Other (specify): Schools, Churches						2				2
Other (specify):										
TOTALS:	33940	1100	10	200	35250	**89**	**1**		**11**	**101**

D4d. Components of Water Losses

Details	Example Result	Actual Result	Units
Water Losses = System Input – Authorised Consumption	2750	68	10^3 m^3/yr
Percentage of Total Losses estimated to represent the Apparent Losses	20	15	%
Apparent Losses	550	10	10^3 m^3/yr

Annual Real Losses (ARL) = Water Losses – Apparent Losses	**2200**	**58**	10^3 m^3/yr

D5. SELECTED OPERATIONAL PERFORMANCE INDICATORS

D5a. Current Annual Real Losses per Connection (CARL) at Current Pressures

Details	Calculation	Example Result	Actual Result	Units
CARL is expressed in Litres/service connection/day, when system is pressurised	ARL x 10^6 / (Ns x T/100 x 365)	**100**	**307**	Litres /conn./day
Consumption in litres/conn/day		**1610**	**532**	Litres /conn./day

D5b. Infrastructure Leakage Index (ILI)

Details	Calculation	Example Result	Actual Result
ILI is the ratio of Current Annual Real Losses (CARL) to Unavoidable Annual Real Losses	CARL / UARL	**1.79**	**6.30**

D5c. Non-Revenue Water as a % by Volume of System Input

Description of Unbilled Items	Example Result			Actual Result		
	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input
Unbilled Consumption	210	38000	0.55	11	170	6.38
Apparent Losses:	550	38000	1.45	10	170	6.06
Real Losses:	2200	38000	5.79	58	170	34.34
Total Unbilled:	**2960**	**38000**	**7.79**	**79**	**170**	**46.78**

D6. SELECTED FINANCIAL PERFORMANCE INDICATORS

D6a. Local Valuation of Real and Apparent Losses

Details	Example Result	Actual Result	Units
Unit Value of Real Losses (eg bulk purchase price)	0.15	3.38	R /m^3
Unit Value of Apparent Losses (eg selling price)	2.70	10.22	R /m^3

D6b. Annual Cost of Running System

Details	Example Cost	Actual Cost	Units
Annual Cost of running system in 1000's of Rand per year	45000	3236	10^3 R/year

D6c. Non-Revenue Water as % by Value of Cost of Running System

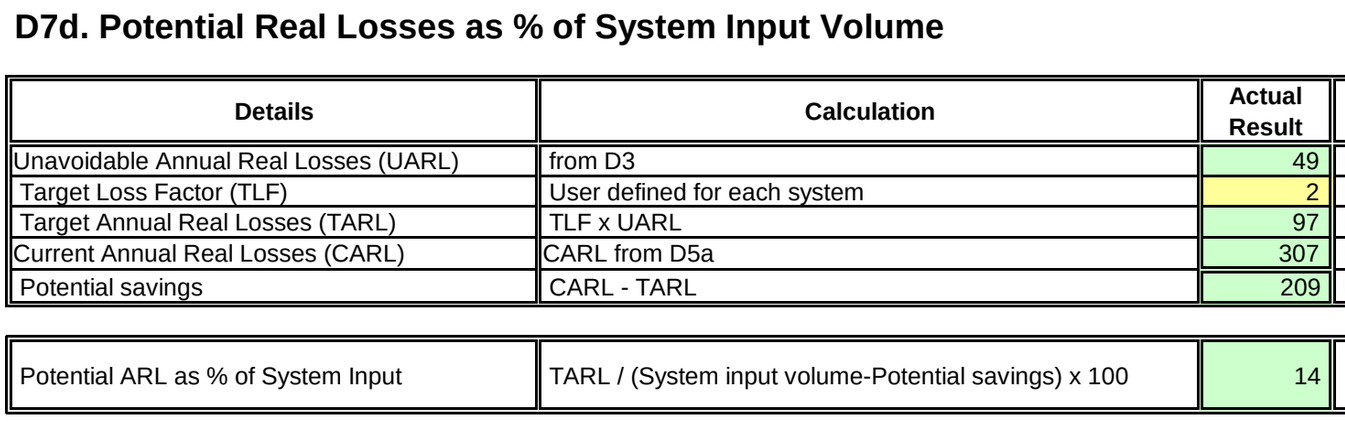
Description of Unbilled Items	Example Result				Actual Result			
	Volume 10^3 m^3/yr	Unit Value R /m^3	Value 10^3 R/year	% of Annual Running Costs Costs	Volume 10^3 m^3/yr	Unit Value (R /m^3)	Value 10^3 R/year	% of Annual Running Costs Costs
Unbilled Consumption	210	2.70	567	1.26	11	10.22	111	3.42
Apparent Losses:	550	2.70	1485	3.30	10	10.22	105	3.24
Real Losses:	2200	0.15	330	0.73	58	3.38	197	6.08
Total Unbilled:	2960		**2382**	**5.29**	79		412	**12.74**

D7. RELATIONSHIP BETWEEN REAL LOSSES EXPRESSED AS % OF SYSTEM INPUT

D7a. Real losses curve definition

Curve Definition					
Consumption litres/serv conn/day	Real losses in litres/service connection/day				
	50	100	200	500	1000
100	33.3	50.0	66.7	83.3	90.9
250	16.7	28.6	44.4	66.7	80.0
500	9.1	16.7	28.6	50.0	66.7
1000	4.8	9.1	16.7	33.3	50.0
2000	2.4	4.8	9.1	20.0	33.3
3000	1.6	3.2	6.3	14.3	25.0
5000	1.0	2.0	3.8	9.1	16.7
10000	0.5	1.0	2.0	4.8	9.1

D7b. Components of water balance in litres/service connection/day (Actual Results)



D7c. Current Real Losses as % of System Input Volume

Details	Calculation	Actual Result	Units
System Input Volume	from D7b	893	Litres/conn/day
Total Consumption	from D7b	586	Litres/conn/day
Annual Real Losses	from D7b	307	Litres/conn/day

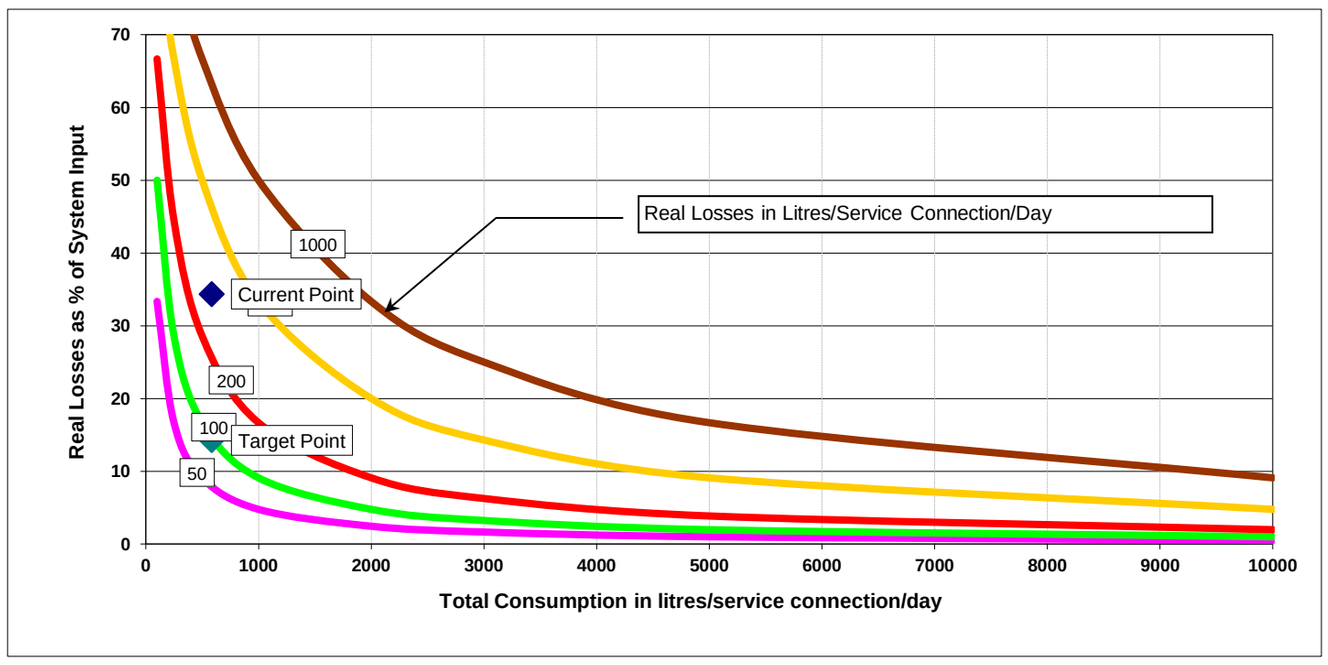
ARL as % of System Input	ARL / System input volume x 100	34	%

D7d. Potential Real Losses as % of System Input Volume

Details	Calculation	Actual Result	Units
Unavoidable Annual Real Losses (UARL)	from D3	49	Litres/conn/day
Target Loss Factor (TLF)	User defined for each system	2	Dimensionless
Target Annual Real Losses (TARL)	TLF x UARL	97	Litres/conn/day
Current Annual Real Losses (CARL)	CARL from D5a	307	Litres/conn/day
Potential savings	CARL - TARL	209	Litres/conn/day

Potential ARL as % of System Input	TARL / (System input volume-Potential savings) x 100	14	%

D7e. Real Losses as a % of System Input Volume versus Consumption in litres/service connection/day, for different values of Real Losses in litres/service connection/day



SUMMARY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

P09196

S1. SYSTEM NAME AND CONTACT DETAILS

Name of Water Undertaking		George Municipality
Name of Water Supply System		Uniondale
Contact Details:	Name	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

S2. Performance Indicators of Water Loss

Viewpoint	Level	Parameter	Typical Range Excellent	Good	Poor	Actual PI	Units
Operations management of distribution system at current pressure	**Basic**	% of year system is pressurised	100	100	<100	100	%
		Current Annual Real Losses (CARL) (when system is pressurised - see note 2)	30 to 100	100 to 200	>200	254	Litres/connection/day
	Detailed	Unavoidable Annual Real Losses (UARL) (see note 3)	n/a	n/a	n/a	27	Litres/connection/day
		Consumption	n/a	n/a	n/a	462	Litres/connection/day
		Infrastructure Leakage Index (ILI) (= CARL/UARL : see note 4)	1	2	>3.0	9.5	non dimensional
Financial management aspects of water losses	**Basic**	Volume of non-revenue water as a% of system input volume (see note 5)	<10%	20%	30%	44	%
	Detailed	Value of non-revenue water as a % of annual cost of running the system (see note 6)	<5%	10%	15%	11	%

Notes:

Note1: taken from data in "AQUA" article, December 1999 or estimated by WRP

Note 2: takes account of % of time system is pressurised, but not system pressure, density of connections or customet meter location

Note 3: takes account of density of connections and customer meter location at current pressure

Note 4: measures overall efficiency of management of distribution system at current operating pressure

Note 5: strongly influenced by average consumption per service connection

Note 6: Allows different values of Rand/m3 for different components of non-revenue water

S3. Key Operating Parameters which influence Unavoidable Annual Real Losses (UARL)

Variable	Typical Range Low	Medium	High	Actual PI	Units
Average Operating Pressure	30	45	100	20	Metres
Density of connections	20	45	120	34	per km of mains

4. Key Components of Annual System Input Volume

Component	m3/year	m3/connection/day	% of System Input Volume
Water Exported		not applicable	
Authorised Consumption excluding exports	187825	0.46	60.7
Apparent Losses	18227	0.04	5.9
Actual Consumption excluding exports	206051	0.51	66.6
Real Losses	103284	0.25	33.4
System Input Volume	309335	0.76	100.0

DATA ENTRY SHEET FOR LEAKAGE BENCHMARKING IN SOUTH AFRICA

Note: Note: An example has been included to assist you in completing this data sheet. The example input data can be seen in the pale blue shaded areas. Your input data should appear in the pale yellow shaded areas. The light green shaded areas are protected calculation fields and nothing can be entered in these fields.
Use the units as shown. If you have to use other units; you have to change the appropriate cells.

D1. GENERAL

Name of Water Undertaking	George Municipality	
Name of Water Supply System	Uniondale	
Contact Details:	**Name**	Mr F Abrahams
	Address	PO Box 19
		George
		6530
	Telephone	+27(44) 801 9348
	Fax	+27(44) 873 3862
	E-mail	fabrahams@george.gov.za

D2. SYSTEM DATA

Input Description	Variable	Example Data	Actual Data	Units	
Length of Mains (Transmission + Distribution)	Lm	1500	33	km	
Number of Service Connections	Ns	60000	1115	Number	See Notes 1 & 2
Density of Service Connections (per km of mains)	Ns/Lm	40	34	Per km	
Percentage of time system is pressurised during year	T	100	100	%	See Note 3
Average operating pressure when system pressurised	P	45	20	metres	See Note 4
Population served by the supply system	Pop	100000	5937	Number	

Note 1: The number of service connections is not always the same as the number of meters or billed accounts. For South African conditions, however, you can use the total of the number of metered accounts plus the estimated number of unmetered connections

Note 2: In South Africa customer meters are usually located close to the street/stand boundary. If this is not the case for your system, then add a note here.

Average number of consumers from July 2022 to June 2023 = 1 097 (Treasury) + Number of standpipes in informal areas = 7 + Number of communal flush toilet facilities = 11. Total therefore 1115

Note 3: Use T in % eg. If T = 80%, use 80 and not 0.8

Note 4: If you do not have an accurate figure, please make a best estimate and provide brief details of how you derived it.

Calculated from 2021 GLS wadiso water model data (Pipe Length, Average Dynamic Head and Average Static Head)

D3. UNAVOIDABLE ANNUAL REAL LOSSES (UARL)

Details	Calculation	Example Result	Actual Data	Units
On mains	$18 \times Lm \times P \times 365 \times T/10^8$	443	4	10^3 m^3/yr
On Service Connections	$0.8 \times Ns \times P \times 365 \times T/10^8$	788	7	10^3 m^3/yr
Total Volume of UARL		**1232**	**11**	10^3 m^3/yr

UARL in litres/service conn./day when the system is pressurised	Annual Volume of UARL $\times 10^6$ / (Ns x 365 x T/100)	**56**	**27**	Litres/ conn./day

D4. ANNUAL WATER BALANCE DATA

D4a. Data Period

		Example Data	Actual Data
12-MONTH PERIOD FOR WHICH DATA APPLIES	**Start Date**	April 1, 1998	July 1, 2022
	End Date	March 31, 1999	June 30, 2023

D4b. System Input Volume

Water Supplied	**Example Data**					**Actual Data**				
	Metered 10^3 m^3/yr	**Correction to Source Meter data**		**Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**	**Metered 10^3 m^3/yr**	**Correction to Source Meter data**		**Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**
		+/- %	**10^3 m^3/yr**				**+/- %**	**10^3 m^3/yr**		
From Own Sources:	36000	2.00%	720		36720	309				309
From Other Suppliers:	1000			280	1280					
Total:	37000		720	280	38000	**309**				**309**

D4c. Components of Authorised Consumption

Components of Authorised Consumption	**Example Data**					**Actual Data**				
	Billed Metered 10^3 m^3/yr	**Billed Unmetered 10^3 m^3/yr**	**Unbilled Metered 10^3 m^3/yr**	**Unbilled Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**	**Billed Metered 10^3 m^3/yr**	**Billed Unmetered 10^3 m^3/yr**	**Unbilled Metered 10^3 m^3/yr**	**Unbilled Unmetered 10^3 m^3/yr**	**Total 10^3 m^3/yr**
Water Exported:	1500				1500					
Households:	24500	500			25000	137	2		11	149
Non-households:	6900	100			7000	29				29
Standpipes:		500	10		510				2	2
Firefighting:				100	100				0	0
Mains Flushing:				100	100				0	0
Building water:	1040				1040					
Other (specify): Schools, Churches						5				5
Other (specify): Municipal						2				2
TOTALS:	33940	1100	10	200	35250	**173**	**2**		**13**	**188**

D4d. Components of Water Losses

Details	**Example Result**	**Actual Result**	**Units**
Water Losses = System Input – Authorised Consumption	2750	122	10^3 m^3/yr
Percentage of Total Losses estimated to represent the Apparent Losses	20	15	%
Apparent Losses	550	18	10^3 m^3/yr

Annual Real Losses (ARL) = Water Losses – Apparent Losses	**2200**	**103**	10^3 m^3/yr

D5. SELECTED OPERATIONAL PERFORMANCE INDICATORS

D5a. Current Annual Real Losses per Connection (CARL) at Current Pressures

Details	Calculation	Example Result	Actual Result	Units
CARL is expressed in Litres/service connection/day, when system is pressurised	ARL x 10^6 / (Ns x T/100 x 365)	**100**	**254**	Litres /conn./day
Consumption in litres/conn/day		**1610**	**462**	Litres /conn./day

D5b. Infrastructure Leakage Index (ILI)

Details	Calculation	Example Result	Actual Result
ILI is the ratio of Current Annual Real Losses (CARL) to Unavoidable Annual Real Losses	CARL / UARL	**1.79**	**9.53**

D5c. Non-Revenue Water as a % by Volume of System Input

Description of Unbilled Items	Example Result			Actual Result		
	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input	Volume 10^3 m^3/yr	System Input 10^3 m^3/yr	% of System Input
Unbilled Consumption	210	38000	0.55	13	309	4.26
Apparent Losses:	550	38000	1.45	18	309	5.89
Real Losses:	2200	38000	5.79	103	309	33.39
Total Unbilled:	**2960**	**38000**	**7.79**	**135**	**309**	**43.54**

D6. SELECTED FINANCIAL PERFORMANCE INDICATORS

D6a. Local Valuation of Real and Apparent Losses

Details	Example Result	Actual Result	Units
Unit Value of Real Losses (eg bulk purchase price)	0.15	3.38	R /m^3
Unit Value of Apparent Losses (eg selling price)	2.70	10.22	R /m^3

D6b. Annual Cost of Running System

Details	Example Cost	Actual Cost	Units
Annual Cost of running system in 1000's of Rand per year	45000	5905	10^3 R/year

D6c. Non-Revenue Water as % by Value of Cost of Running System

Description of Unbilled Items	Example Result				Actual Result			
	Volume 10^3 m^3/yr	Unit Value R /m^3	Value 10^3 R/year	% of Annual Running Costs Costs	Volume 10^3 m^3/yr	Unit Value (R /m^3)	Value 10^3 R/year	% of Annual Running Costs Costs
Unbilled Consumption	210	2.70	567	1.26	13	10.22	135	2.28
Apparent Losses:	550	2.70	1485	3.30	18	10.22	186	3.15
Real Losses:	2200	0.15	330	0.73	103	3.38	349	5.91
Total Unbilled:	2960		**2382**	**5.29**	135		670	**11.35**

D7. RELATIONSHIP BETWEEN REAL LOSSES EXPRESSED AS % OF SYSTEM INPUT

D7a. Real losses curve definition

Curve Definition					
Consumption litres/serv conn/day	Real losses in litres/service connection/day				
	50	100	200	500	1000
100	33.3	50.0	66.7	83.3	90.9
250	16.7	28.6	44.4	66.7	80.0
500	9.1	16.7	28.6	50.0	66.7
1000	4.8	9.1	16.7	33.3	50.0
2000	2.4	4.8	9.1	20.0	33.3
3000	1.6	3.2	6.3	14.3	25.0
5000	1.0	2.0	3.8	9.1	16.7
10000	0.5	1.0	2.0	4.8	9.1

D7b. Components of water balance in litres/service connection/day (Actual Results)

System Input Volume = 760	**Total Consumption** = 506	**Billed Authorised Consumption** = 429	**Authorised Consumption** = 462	**Revenue Water** 429
		Unbilled Authorised Consumption = 32		**Non-Revenue Water** = 331
		Apparent Losses = 45	**Total Losses** = 299	
	Real Losses = 254			

D7c. Current Real Losses as % of System Input Volume

Details	Calculation	Actual Result	Units
System Input Volume	from D7b	760	Litres/conn/day
Total Consumption	from D7b	506	Litres/conn/day
Annual Real Losses	from D7b	254	Litres/conn/day

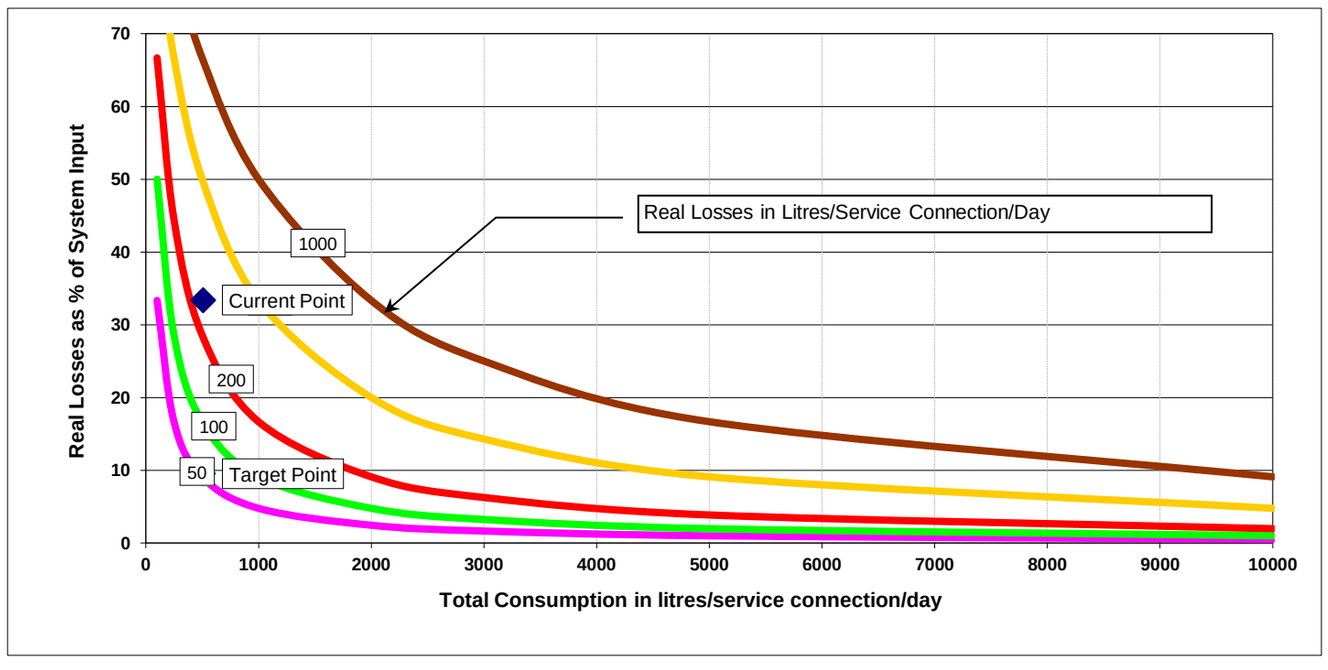
ARL as % of System Input	ARL / System input volume x 100	33	%

D7d. Potential Real Losses as % of System Input Volume

Details	Calculation	Actual Result	Units
Unavoidable Annual Real Losses (UARL)	from D3	27	Litres/conn/day
Target Loss Factor (TLF)	User defined for each system	2	Dimensionless
Target Annual Real Losses (TARL)	TLF x UARL	53	Litres/conn/day
Current Annual Real Losses (CARL)	CARL from D5a	254	Litres/conn/day
Potential savings	CARL - TARL	201	Litres/conn/day

Potential ARL as % of System Input	TARL / (System input volume-Potential savings) x 100	10	%

D7e. Real Losses as a % of System Input Volume versus Consumption in litres/service connection/day, for different values of Real Losses in litres/service connection/day



IWA WATER BALANCE SPREADSHEET
Baseline determination: Municipal Water Services

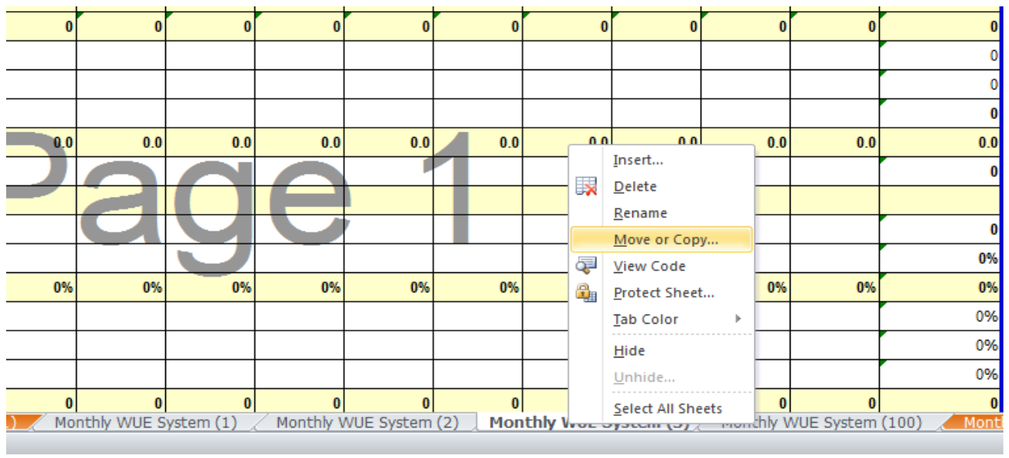
Index and notes

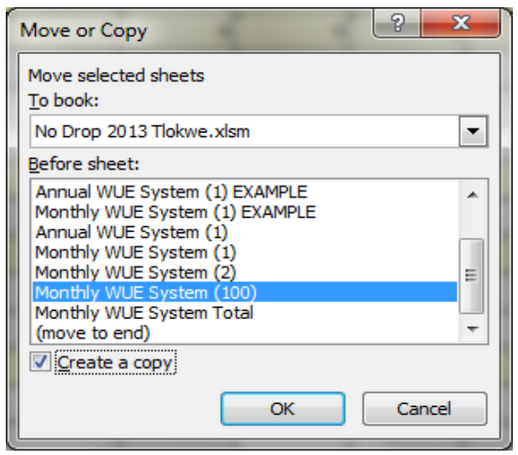
Contact & Source Info
Complete this sheet first. Add contract details, select data start date and provide source of information.

Definitions
Provides a short description of the IWA water balance
Guideline for determining apparent / commercial losses.

Calculations
Provides a short description of the monthly and annual spreadsheet calculations.

Monthly WUE System (1)
Provide details of the monthly water balance for a specific system.
To add a system, right click on the last sheet tab (before number 100). Click on "Move or copy..", click on "Monthly WUE System (100) and tick "Create a copy". (See below)
Do not delete System (1) of System (100) and ensure all new systems sheets are added between System (1) and System (100).





Monthly WUE System Total
Totalise the WUE Systems. The values in the total (last) column is transferred to Annual WUE System for the specific year.

Source of Information
Description of information sources to calculate the IWA water balance.

Water resources
Water resource balance diagram based on the All Town or Reconciliation strategies which could be found on the DWS website.
https://www.dwa.gov.za/projects.aspx for Reconciliation Strategies
https://www6.dwa.gov.za/DocPortal/ for All Town Strategies

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IWA WATER BALANCE SPREADSHEET
Baseline determination: Municipal Water Services

Contact and Sources of Information

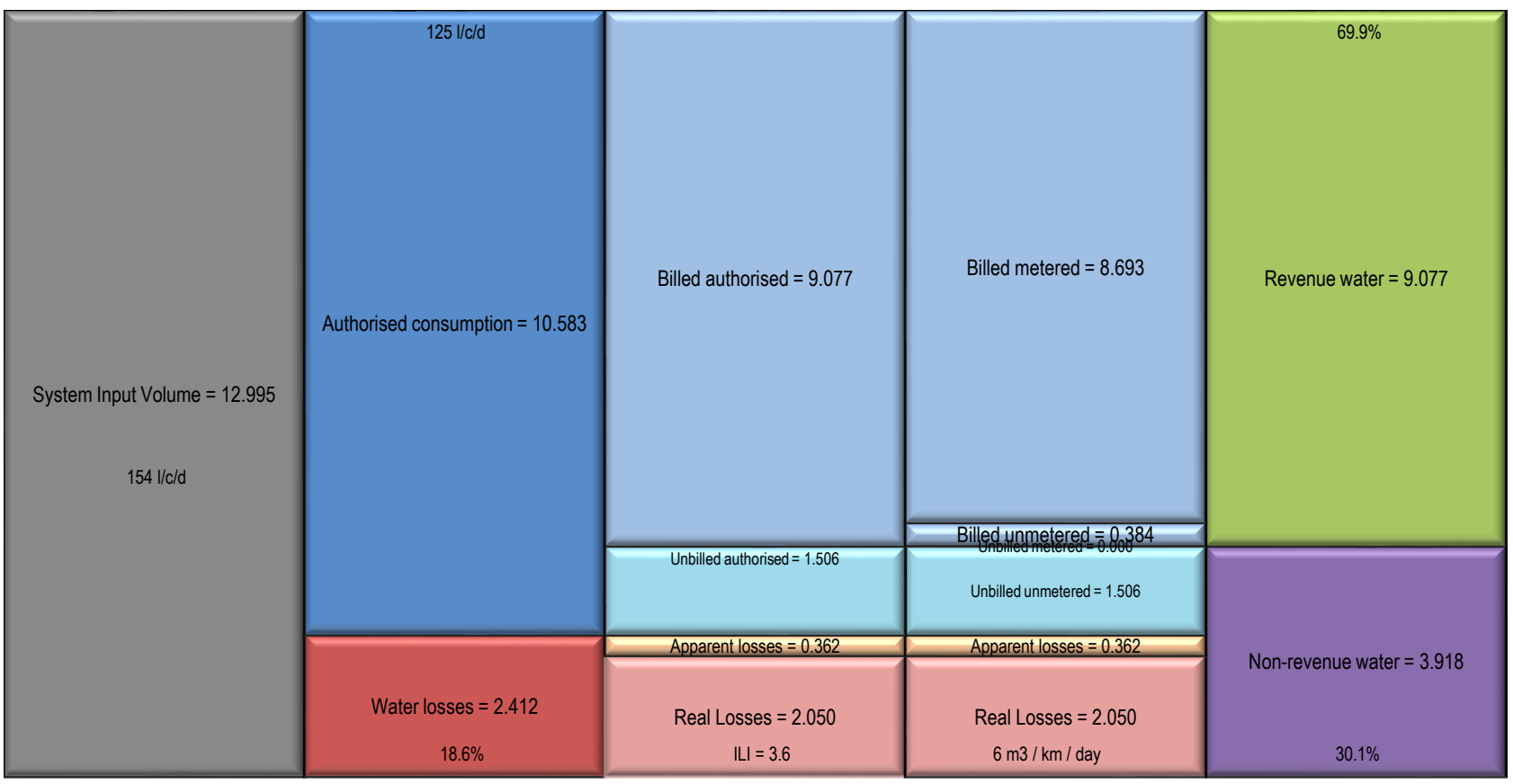
Province	*Western Cape*	**WSA**	**Yes**
District Municipality	*Garden Route District Municipality*	**Category**	B
Municipal Code	*WC044*		
Municipality	*George Municipality*		
Water Supply System	*George and Wilderness, Uniondale and Haarlem Water Supply System*		
Total No. of Water Supply Systems	*1, 2 and 3*		
Settlements	*George and Wilderness, Uniondale and Haarlem*		
Information supplied by:			
Name	*Mr Deon de Jager*		
Position	*Deputy Director: Water and Sanitation*		
Telephone	*044-801 9352*		
Cellphone	*0834534781*		
E-mail	*ddejager@george.gov.za*		
Data start date	Jul-17		

				Source of information
Input Data	**Population served**	**No**		Census, WSDP, Water Services Audit
	Households served	**No**		Census, WSDP, Water Services Audit
	Connections - metered	**No**		
	Domestic (and non-domestic)	No		Number of Billed Residential Metered Consumer Units from Finance Department
	Non-domestic	No		Number of Billed Non-Domestic Metered Consumer Units from Finance Department
	Connections - unmetered	**No**		Water Services Audit
	Length of mains	**km**		Water Services Audit
	Average system pressure	**m**		Calculated from 2021 GLS wadiso water model data (Pipe Length, Average Dynamic Head and Average Static He
	Time system pressurised	**%**		Water Services Audit
	Consumer meter age	%		Water Services Audit (7%)
	Illegal connections	%		Water Services Audit (3%)
	Data transfer	%		Water Services Audit (5%)
Water Balance Calculations	**System input volume**	**kl/annum**		Calculated
	Own sources	kl/annum		Water Services Audit, from meter readings
	Other sources	kl/annum		Water Services Audit, from meter readings
	Authorised Consumption	**kl/annum**		Calculated
	Billed authorised	**kl/annum**		Calculated
	Billed metered	kl/annum		Calculated
	Domestic (& non-domestic)	kl/annum		Finance Department per Tariff Code (Water Services Audit)
	Non-domestic	kl/annum		Finance Department per Tariff Code (Water Services Audit)
	Export volume	kl/annum		Not Applicable
	Billed unmetered	kl/annum		Flat rate erven, as calculated from 2022 Swift data, at 15Kl/month
	Unbilled authorised	**kl/annum**		Calculated
	Unbilled metered	kl/annum		Not Applicable
	Unbilled unmetered	kl/annum		Calculated as 0.2% of System Input Volume + "No consumption" erven, as calculated from 2022 Swift data, at 15
	Projected SIV without WDM	**kl/annum**		
	Projected SIV with WDM	**kl/annum**		

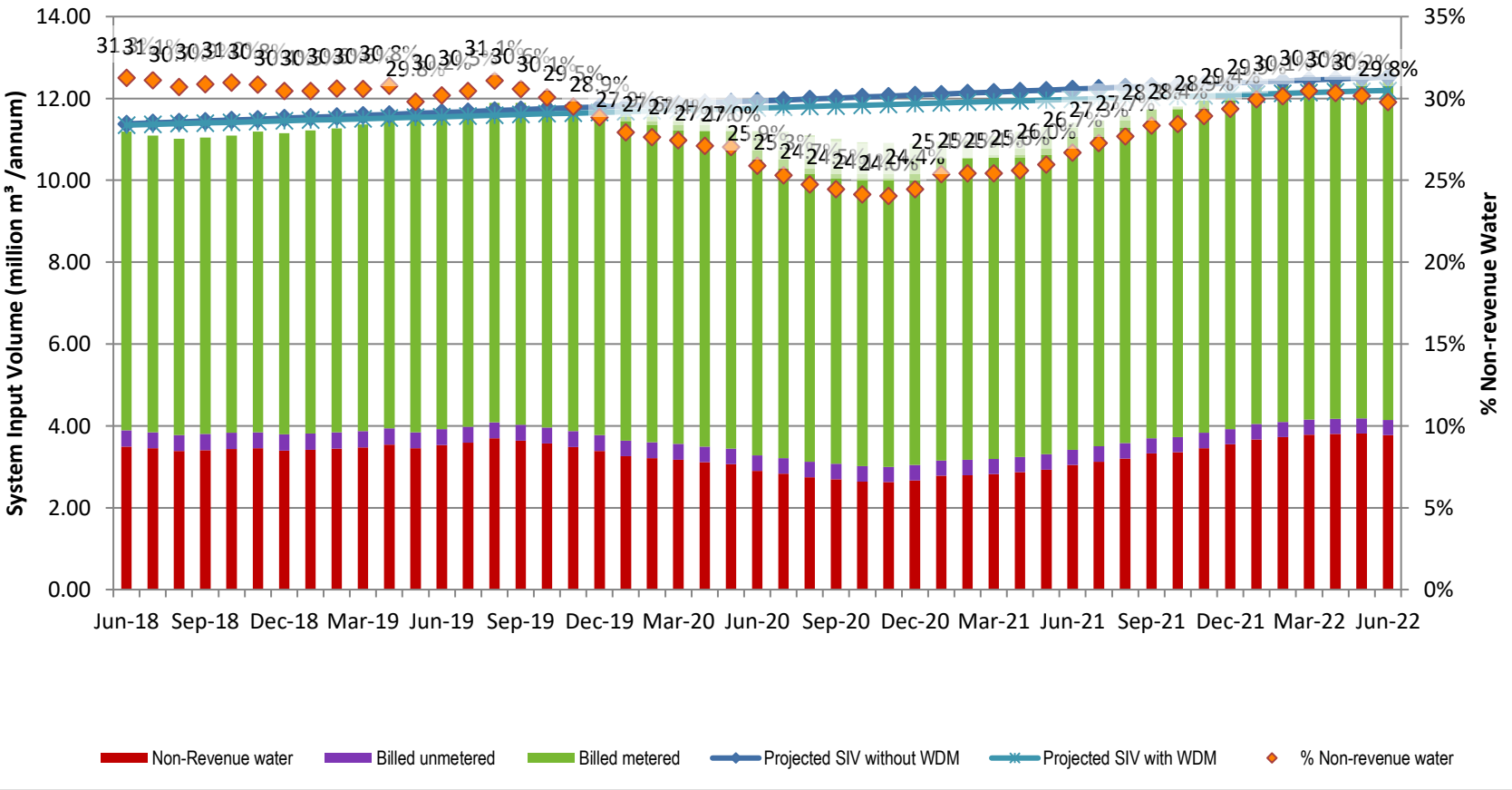
IWA ANNUAL WATER BALANCE SPREADSHEET - Baseline determination: Municipal Water Services

Province	*Western Cape*
District Municipality	*Garden Route District Municipality*
Municipal Code	*WC044*
Municipality	*George Municipality*
Water Supply System	*George and Wilderness, Uniondale and Haarlem Water Supply System*
Total No of Supply Systems	*3*
Settlements	*George and Wilderness, Uniondale and Haarlem*

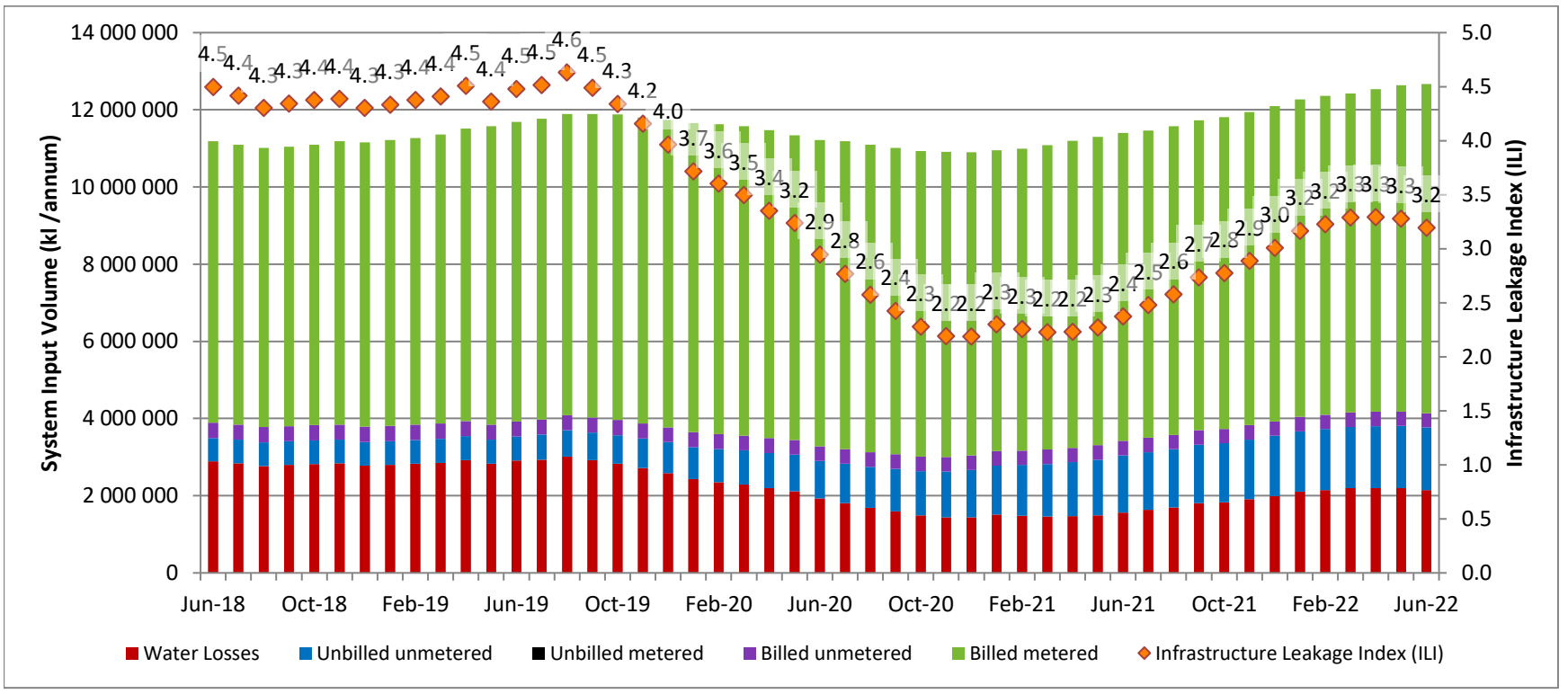
IWA Water Balance Diagram (million m^3/annum) for **Jun-23 (select year)**



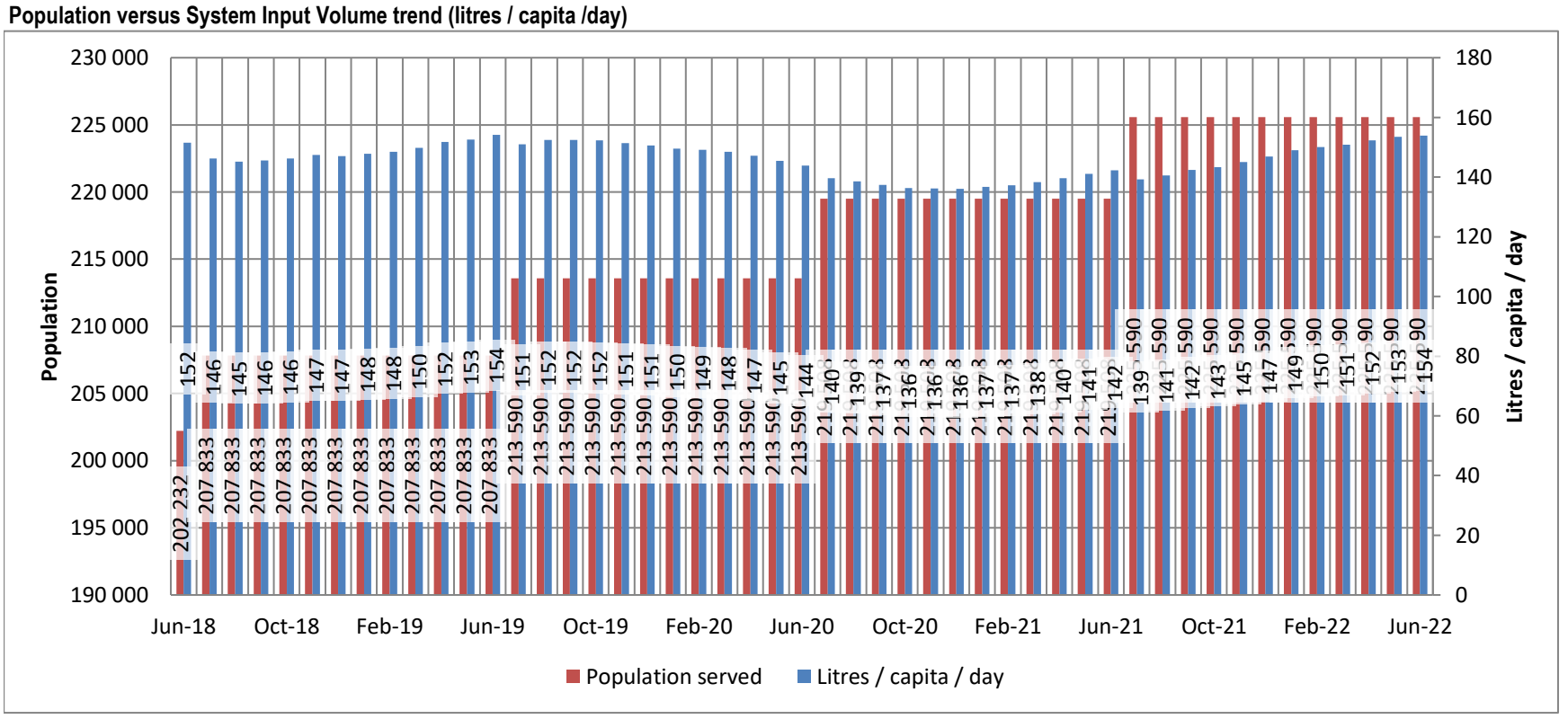
Non-revenue water trend



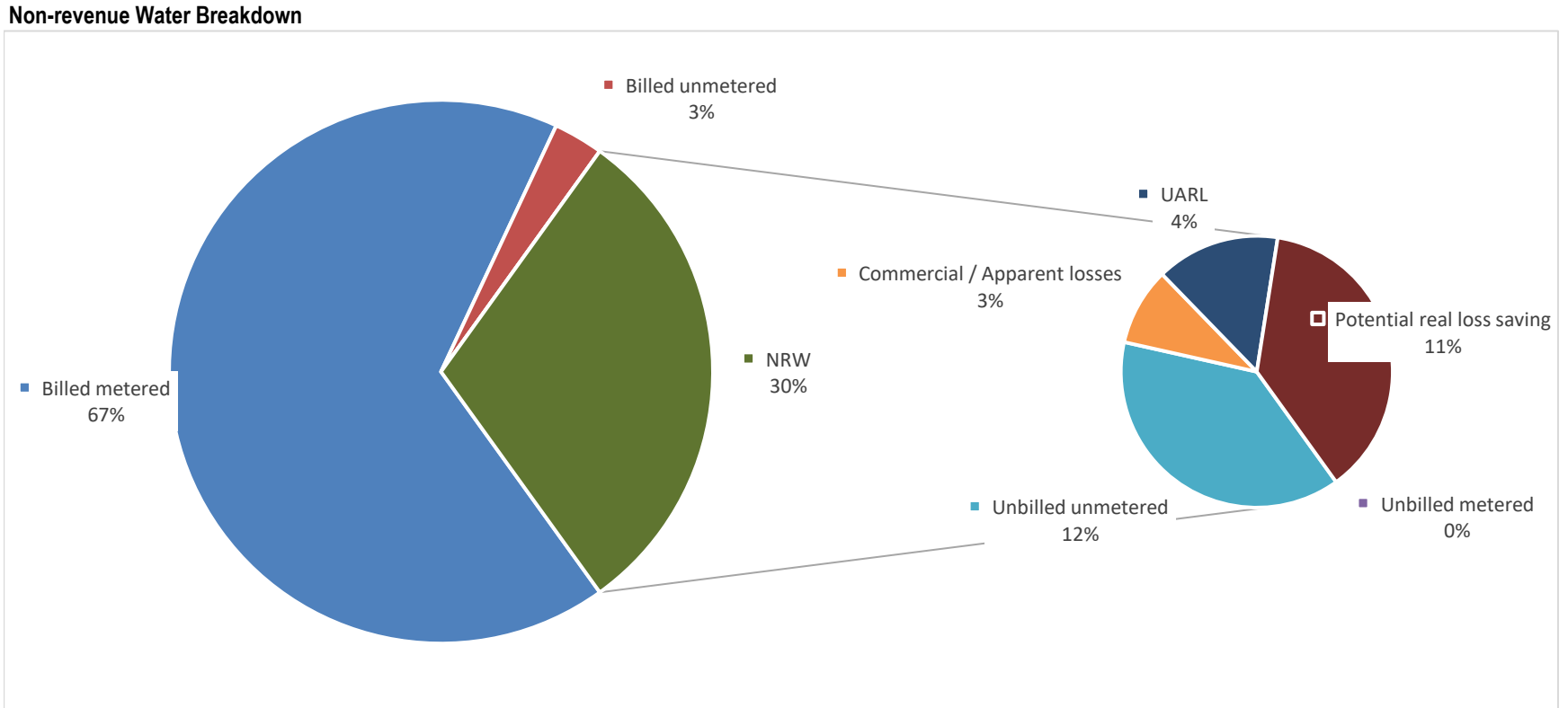
Water loss trend



Population versus System Input Volume trend (litres / capita /day)



Non-revenue Water Breakdown



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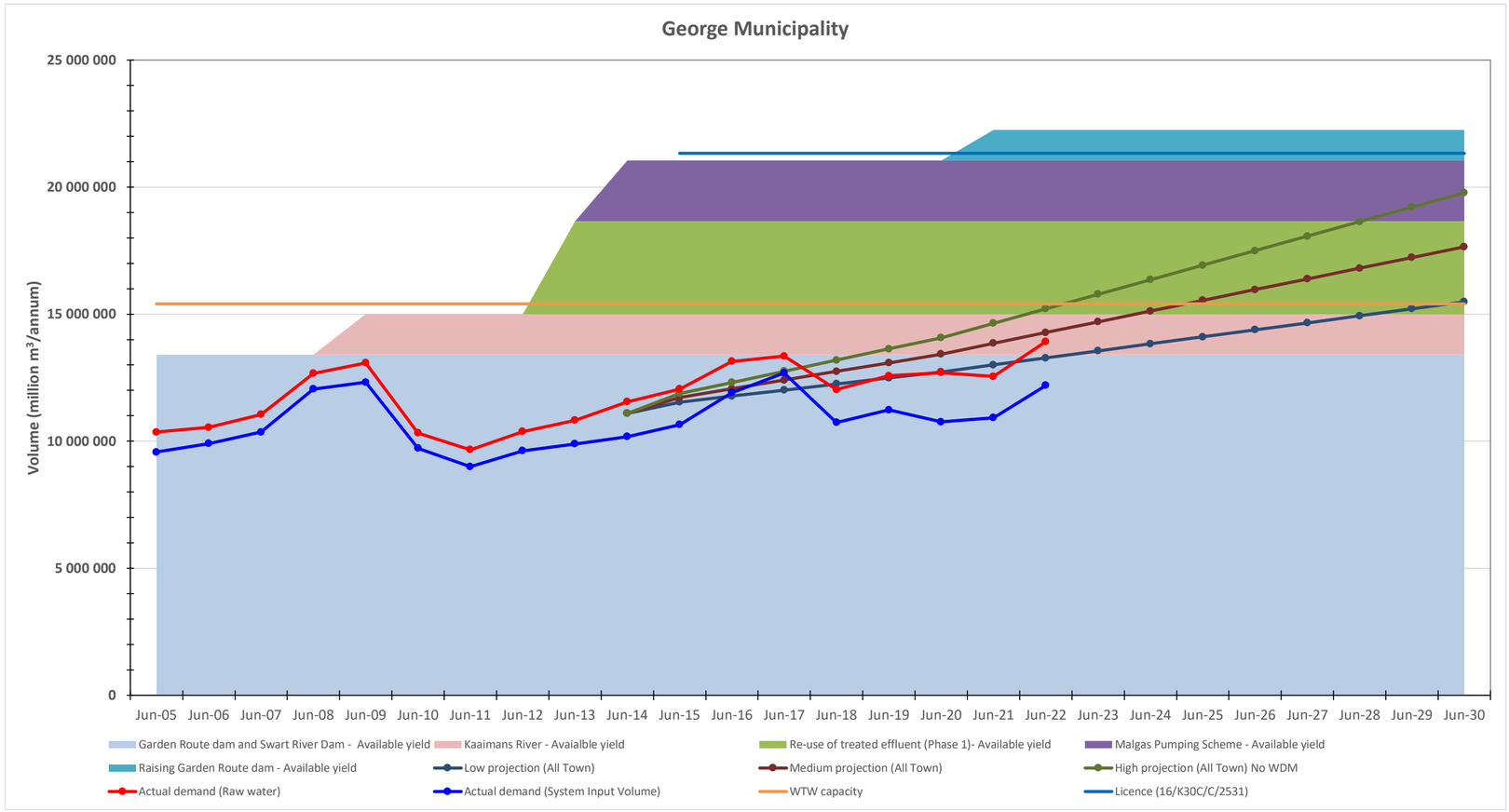
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

WATER RESOURCE BALANCE SPREADSHEET
Baseline determination: Municipal Water Services

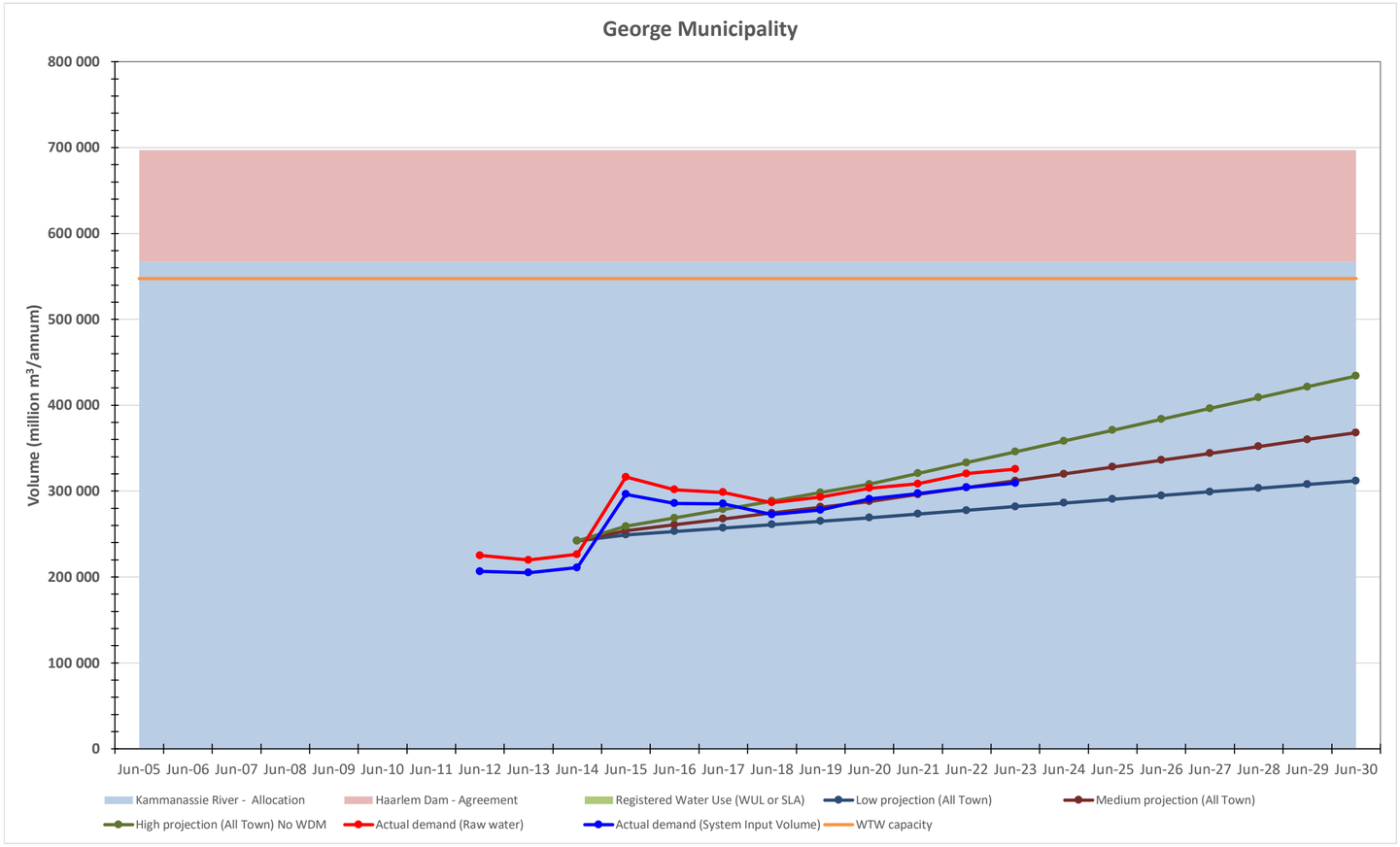
Province	*Western Cape*																												
District Municipality	*Garden Route District Municipality*																												
Municipality	*George Municipality*				**Municipal Code**	WC044																							
Water Supply System	*George & Wilderness Water Supply System*																												
Settlements	*George & Wilderness*																												
	Year ending	**Jun-05**	**Jun-06**	**Jun-07**	**Jun-08**	**Jun-09**	**Jun-10**	**Jun-11**	**Jun-12**	**Jun-13**	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**	**Jun-22**	**Jun-23**	**Jun-24**	**Jun-25**	**Jun-26**	**Jun-27**	**Jun-28**	**Jun-29**	**Jun-30**
Resources	Garden Route dam and Swart River Dam - Available yield	kl/annum	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000	13 400 000
	Kaaimans River - Avaialble yield	kl/annum					1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000	1 600 000
	Re-use of treated effluent (Phase 1)- Available yield	kl/annum									3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000	3 650 000
	Malgas Pumping Scheme - Available yield	kl/annum										2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000	2 400 000
	Raising Garden Route dam - Available yield	kl/annum																1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000	1 200 000
Projections & Actual Demands	Low projection (All Town)	kl/annum										11 092 000	11 536 000	11 773 800	12 011 600	12 249 400	12 487 200	12 725 000	13 001 100	13 277 200	13 553 300	13 829 400	14 105 500	14 381 600	14 657 700	14 933 800	15 209 900	15 486 000
	Medium projection (All Town)	kl/annum										11 092 000	11 714 000	12 056 800	12 399 600	12 742 400	13 085 200	13 428 000	13 850 200	14 272 400	14 694 600	15 116 800	15 539 000	15 961 200	16 383 400	16 805 600	17 227 800	17 650 000
	High projection (All Town) No WDM	kl/annum										11 092 000	11 872 000	12 311 600	12 751 200	13 190 800	13 630 400	14 070 000	14 640 800	15 211 600	15 782 400	16 353 200	16 924 000	17 494 800	18 065 600	18 636 400	19 207 200	19 778 000
	Bulk water supplier	kl/annum																										
	Actual demand (Raw water)	kl/annum	10 359 494	10 543 586	11 052 890	12 667 247	13 084 369	10 321 424	9 660 182	10 381 569	10 821 776	11 548 294	12 049 853	13 138 812	13 343 270	12 032 499	12 572 241	12 699 335	12 546 113	13 918 494	13 380 763								
	Actual demand (System Input Volume)	kl/annum	9 571 279	9 908 690	10 357 454	12 049 496	12 314 703	9 723 071	8 997 350	9 621 958	9 889 679	10 176 157	10 646 690	11 912 104	12 682 179	10 740 068	11 227 099	10 756 135	10 923 449	12 194 564	12 516 340								
% Growth of Projections & Actual Demands	Low projection (All Town)	%											4.0%	2.1%	2.0%	2.0%	1.9%	1.9%	2.2%	2.1%	2.1%								
	Medium projection (All Town)	%											5.6%	2.9%	2.8%	2.8%	2.7%	2.6%	3.1%	3.0%	3.0%								
	High projection (All Town)	%											7.0%	3.7%	3.6%	3.4%	3.3%	3.2%	4.1%	3.9%	3.8%								
	Bulk water supplier	%																											
		%																											
		%																											
		%		1.8%	4.8%	14.6%	3.3%	-21.1%	-6.4%	7.5%	4.2%	6.7%	4.3%	9.0%	1.6%	-9.8%	4.5%	1.0%	-1.2%	10.9%	-3.9%								
	Actual demand (SIV)	%		3.5%	4.5%	16.3%	2.2%	-21.0%	-7.5%	6.9%	2.8%	2.9%	4.6%	11.9%	6.5%	-15.3%	4.5%	-4.2%	1.6%	11.6%	2.6%								
Infrastructure capacity	WTW capacity	kl/annum	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000	15 403 000
	Licence (16/K30C/C/2531)	kl/annum											21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000	21 330 000


George Municipality
Volume (million m³/annum)
25 000 000
20 000 000
15 000 000
10 000 000
5 000 000
0
Jun-05
Jun-06
Jun-07
Jun-08
Jun-09
Jun-10
Jun-11
Jun-12
Jun-13
Jun-14
Jun-15
Jun-16
Jun-17
Jun-18
Jun-19
Jun-20
Jun-21
Jun-22
Jun-23
Jun-24
Jun-25
Jun-26
Jun-27
Jun-28
Jun-29
Jun-30
Garden Route dam and Swart River Dam - Available yield
Kaaimans River - Avaialble yield
Re-use of treated effluent (Phase 1)- Available yield
Malgas Pumping Scheme - Available yield
Raising Garden Route dam - Available yield
Low projection (All Town)
Medium projection (All Town)
High projection (All Town) No WDM
Actual demand (Raw water)
Actual demand (System Input Volume)
WTW capacity
Licence (16/K30C/C/2531)

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

WATER RESOURCE BALANCE SPREADSHEET
Baseline determination: Municipal Water Services

Province	*Western Cape*																												
District Municipality	*Garden Route District Municipality*																												
Municipality	*George Municipality*	**Municipal Code**	WC044																										
Water Supply System	*Uniondale Water Supply System*																												
Settlements	*Uniondale*																												
		Year ending	**Jun-05**	**Jun-06**	**Jun-07**	**Jun-08**	**Jun-09**	**Jun-10**	**Jun-11**	**Jun-12**	**Jun-13**	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**	**Jun-22**	**Jun-23**	**Jun-24**	**Jun-25**	**Jun-26**	**Jun-27**	**Jun-28**	**Jun-29**	**Jun-30**
Resources	Kammanassie River - Allocation	kl/annum	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000	567 000
	Haarlem Dam - Agreement	kl/annum	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000	130 000
Projections & Actual Demands	Low projection (All Town)	kl/annum										242 000.0	249 000	253 000	257 000	261 000	265 000	269 000	273 300	277 600	281 900	286 200	290 500	294 800	299 100	303 400	307 700	312 000
	Medium projection (All Town)	kl/annum										242 000.0	254 000	260 800	267 600	274 400	281 200	288 000	296 000	304 000	312 000	320 000	328 000	336 000	344 000	352 000	360 000	368 000
	High projection (All Town) No WDM	kl/annum										242 000.0	259 000	268 800	278 600	288 400	298 200	308 000	320 600	333 200	345 800	358 400	371 000	383 600	396 200	408 800	421 400	434 000
	Bulk water supplier	kl/annum																										
	Actual demand (Raw water)	kl/annum								225 103	219 840	226 366	316 304	301 614	298 451	286 582	292 995	303 247	308 454	320 313	325 616							
	Actual demand (System Input Volur	kl/annum								206 483	204 935	210 917	296 374	285 715	285 273	272 755	277 941	290 749	297 306	304 297	309 335							
% Growth of Projections & Actual Demands	Low projection (All Town)	%											2.9%	1.6%	1.6%	1.6%	1.5%	1.5%	1.6%	1.6%	1.5%							
	Medium projection (All Town)	%											5.0%	2.7%	2.6%	2.5%	2.5%	2.4%	2.8%	2.7%	2.6%							
	High projection (All Town)	%											7.0%	3.8%	3.6%	3.5%	3.4%	3.3%	4.1%	3.9%	3.8%							
	Bulk water supplier	%																										
		%																										
		%																										
		%									-2.3%	3.0%	39.7%	-4.6%	-1.0%	-4.0%	2.2%	3.5%	1.7%	3.8%	1.7%							
	Actual demand (SIV)	%									-0.7%	2.9%	40.5%	-3.6%	-0.2%	-4.4%	1.9%	4.6%	2.3%	2.4%	1.7%							
Infrastructure capacity	WTW capacity	kl/annum	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500	547 500
	Registered Water Use (WUL or SLA	kl/annum																										


George Municipality
Volume (million m³/annum)
800 000
700 000
600 000
500 000
400 000
300 000
200 000
100 000
0
Jun-05 Jun-06 Jun-07 Jun-08 Jun-09 Jun-10 Jun-11 Jun-12 Jun-13 Jun-14 Jun-15 Jun-16 Jun-17 Jun-18 Jun-19 Jun-20 Jun-21 Jun-22 Jun-23 Jun-24 Jun-25 Jun-26 Jun-27 Jun-28 Jun-29 Jun-30
Kammanassie River - Allocation
Haarlem Dam - Agreement
Registered Water Use (WUL or SLA)
Low projection (All Town)
Medium projection (All Town)
High projection (All Town) No WDM
Actual demand (Raw water)
Actual demand (System Input Volume)
WTW capacity

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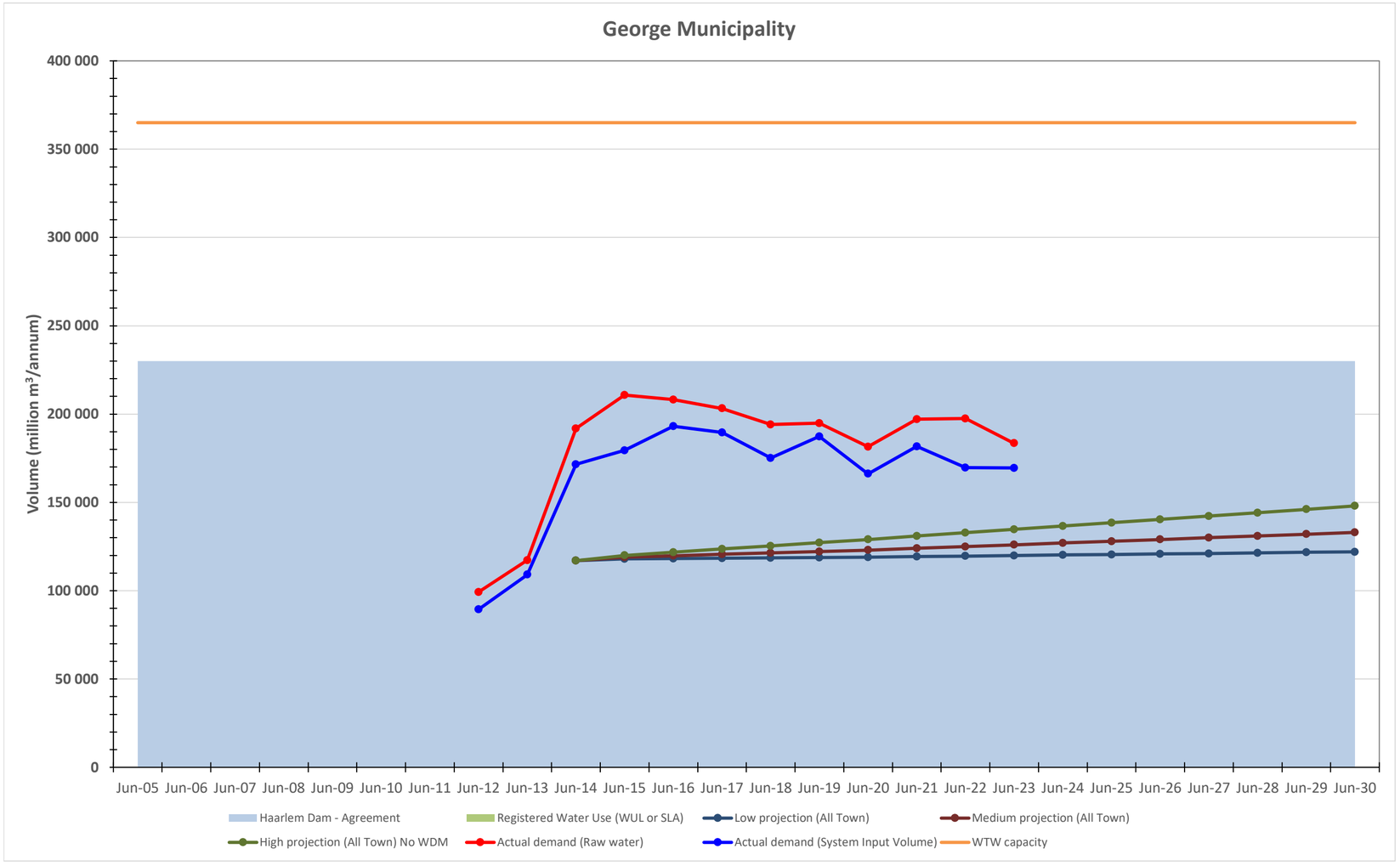
Department: Water and Sanitation
REPUBLIC OF SOUTH AFRICA

WATER RESOURCE BALANCE SPREADSHEET
Baseline determination: Municipal Water Services

Province	*Western Cape*																												
District Municipality	*Garden Route District Municipality*																												
Municipality	*George Municipality*				**Municipal Code**	WC044																							
Water Supply System	*Haarlem Water Supply System*																												
Settlements	*Haarlem*																												
	Year ending	**Jun-05**	**Jun-06**	**Jun-07**	**Jun-08**	**Jun-09**	**Jun-10**	**Jun-11**	**Jun-12**	**Jun-13**	**Jun-14**	**Jun-15**	**Jun-16**	**Jun-17**	**Jun-18**	**Jun-19**	**Jun-20**	**Jun-21**	**Jun-22**	**Jun-23**	**Jun-24**	**Jun-25**	**Jun-26**	**Jun-27**	**Jun-28**	**Jun-29**	**Jun-30**
Resources	Haarlem Dam - Agreement	kl/annum	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000	230 000
Projections & Actual Demands	Low projection (All Town)	kl/annum										117 000	118 000	118 200	118 400	118 600	118 800	119 000	119 300	119 600	119 900	120 200	120 500	120 800	121 100	121 400	121 700	122 000
	Medium projection (All Town)	kl/annum										117 000	119 000	119 800	120 600	121 400	122 200	123 000	124 000	125 000	126 000	127 000	128 000	129 000	130 000	131 000	132 000	133 000
	High projection (All Town) No WDM	kl/annum										117 000	120 000	121 800	123 600	125 400	127 200	129 000	130 900	132 800	134 700	136 600	138 500	140 400	142 300	144 200	146 100	148 000
	Bulk water supplier	kl/annum																											
	Actual demand (Raw water)	kl/annum								99 241	117 250	191 801	210 763	208 222	203 230	194 084	194 853	181 530	197 042	197 550	183 480								
	Actual demand (System Input Volur	kl/annum								89 405	109 079	171 623	179 453	193 111	189 559	175 090	187 308	166 190	181 724	169 721	169 502								
% Growth of Projections & Actual Demands	Low projection (All Town)	%											0.9%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%								
	Medium projection (All Town)	%											1.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.8%								
	High projection (All Town)	%											2.6%	1.5%	1.5%	1.5%	1.4%	1.4%	1.5%	1.5%	1.4%								
	Bulk water supplier	%																											
		%																											
		%																											
		%									18.1%	63.6%	9.9%	-1.2%	-2.4%	-4.5%	0.4%	-6.8%	8.5%	0.3%	-7.1%								
	Actual demand (SIV)	%									22.0%	57.3%	4.6%	7.6%	-1.8%	-7.6%	7.0%	-11.3%	9.3%	-6.6%	-0.1%								
Infrastructure capacity	WTW capacity	kl/annum	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000	365 000
	Registered Water Use (WUL or SLA	kl/annum																											


George Municipality
Volume (million m³/annum)
400 000
350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
Jun-05 Jun-06 Jun-07 Jun-08 Jun-09 Jun-10 Jun-11 Jun-12 Jun-13 Jun-14 Jun-15 Jun-16 Jun-17 Jun-18 Jun-19 Jun-20 Jun-21 Jun-22 Jun-23 Jun-24 Jun-25 Jun-26 Jun-27 Jun-28 Jun-29 Jun-30
Haarlem Dam - Agreement
Registered Water Use (WUL or SLA)
Low projection (All Town)
Medium projection (All Town)
High projection (All Town) No WDM
Actual demand (Raw water)
Actual demand (System Input Volume)
WTW capacity

George - Input Variables for Water Demand Model									
Parameter / Variable	Year	Income Categorization				Bus.[D]	Industrial[E]	Other[F]	Total
		High Income	Middle Income	Low Income	Sub- Total				
		Units are presented in brackets with the "Parameter Description" - First Column							
Population[A]	2022	71240	106827	45187	223254	-	-	-	-
	2027	74874	117946	63490	256310				
	2032	78694	130222	85344	294260				
	2037	82708	143775	111345	337829				
	2042	86927	158740	142182	387848				
	2047	91361	175261	178652	445274				
Growth (%/year)		Growth in Population				Growth in Demand			-
	2022-2027	1.00%	2.00%	7.04%	2.80%	4%	4%	4%	
	2027-2032	1.00%	2.00%	6.09%	2.80%	4%	4%	4%	
	2032-2037	1.00%	2.00%	5.46%	2.80%	4%	4%	4%	
	2037-2042	1.00%	2.00%	5.01%	2.80%	4%	4%	4%	
	2042-2047	1.00%	2.00%	4.67%	2.80%	4%	4%	4%	
Unit Demand (l/c/d)[B]	2022	120.0	100.0	78.0	-	-	-	-	-
Average Annual Daily Water Requirement (Kl/d - Water Losses Excluded)	2022	8549	10683	3525	-	3966	1841	1644	30207
	2027	8985	11795	4952		4825	2240	2000	34797
	2032	9443	13022	6657		5871	2725	2434	40152
	2037	9925	14378	8685		7143	3316	2961	46406
	2042	10431	15874	11090		8690	4034	3602	53721
	2047	10963	17526	13935		10573	4908	4383	62287
Water Losses (%) [C]	2022	17.8	17.8	17.8		17.8	17.8	17.8	-
	2027	12.5	12.5	12.5		12.5	12.5	12.5	
	2032	11.9	11.9	11.9		11.9	11.9	11.9	
	2037	11.3	11.3	11.3		11.3	11.3	11.3	
	2042	10.6	10.6	10.6		10.6	10.6	10.6	
	2047	10.0	10.0	10.0		10.0	10.0	10.0	
Average Annual Daily Water Requirement (Kl/d)	2022	10394	12988	4285		4822	2238	1999	34488
	2027	10268	13480	5660		5515	2560	2286	37208
	2032	10716	14777	7554		6662	3092	2761	42470
	2037	11183	16200	9786		8048	3736	3336	48553
	2042	11671	17761	12409		9723	4513	4030	55594
	2047	12181	19473	15483		11747	5453	4870	63755
Average Peak Month Daily Water Requirement (Kl/d)	2022	11641	14547	4799	-	5401	2507	2239	38626
	2027	11501	15097	6339		6176	2867	2560	41673
	2032	12002	16550	8460		7461	3463	3093	47566
	2037	12525	18144	10960		9014	4184	3736	54379
	2042	13072	19892	13898		10890	5055	4514	62266
	2047	13643	21810	17341		13157	6107	5454	71406
Peak Day Water Requirement (Kl/d)	2022	14551	18183	5999		6751	3134	2798	**48283**
	2027	14376	18871	7924		7720	3584	3200	**52091**
	2032	15002	20688	10575		9326	4329	3866	**59458**
	2037	15656	22680	13700		11267	5230	4670	**67974**
	2042	16340	24865	17372		13612	6319	5643	**77832**
	2047	17054	27263	21676		16446	7634	6817	**89257**
Total Annual Water Requirement (Kl/year)	2022	3793716	4740658	1564090		1759988	816979	729556	**13404987**
	2027	3747999	4920026	2065771		2012817	934341	834360	**14515314**
	2032	3911247	5393580	2757166		2431531	1128706	1007927	**16630158**
	2037	4081811	5913012	3571836		2937496	1363573	1217661	**19085389**
	2042	4260025	6482790	4529144		3548921	1647394	1471111	**21939384**
	2047	4446236	7107819	5651358		4287820	1990387	1777402	**25261023**
Peak Month Factor[G]	1.12								
Peak Day Factor[H]	1.25								

Notes : → TO USE THIS SHEET, FILL IN THE VARIABLES IN THE SHADED BLOCKS ABOVE

References:

(A) - Projected population for 2022/2023 is based on the Census 2011 data and the estimated future population growth, as agreed with Municipality during January 2014.

(B) - Residential unit demands estimated.

(C) - Water Losses: Calculated water losses from July 2022 to June 2023. Estimated 5.3% reduction in water losses over the next five years.

(D) - Business represents the following: Average calculated value from July 2022 to June 2023 treasury data for Business I category, Code 1402 [kl/month]

(E) - Industrial represents the following: Average calculated value from July 2022 to June 2023 treasury data for Industrial category Code 1404 [kl/month]

(F) - Others represents the following: Average calculated value from July 2022 to June 2023 treasury data for Sportbodies (Code 1403), Buitestedel (Code 1413), Old Age (Code 1414), Governm./Sc (Code 1415), Service Org. (Code 1417), Municipal Dep (Code 1418) and Bulk Other (Code 1419) categories [kl/month]

(G) - Peak Month Factor: Maximum value calculated from July 2018 to June 2023 data.

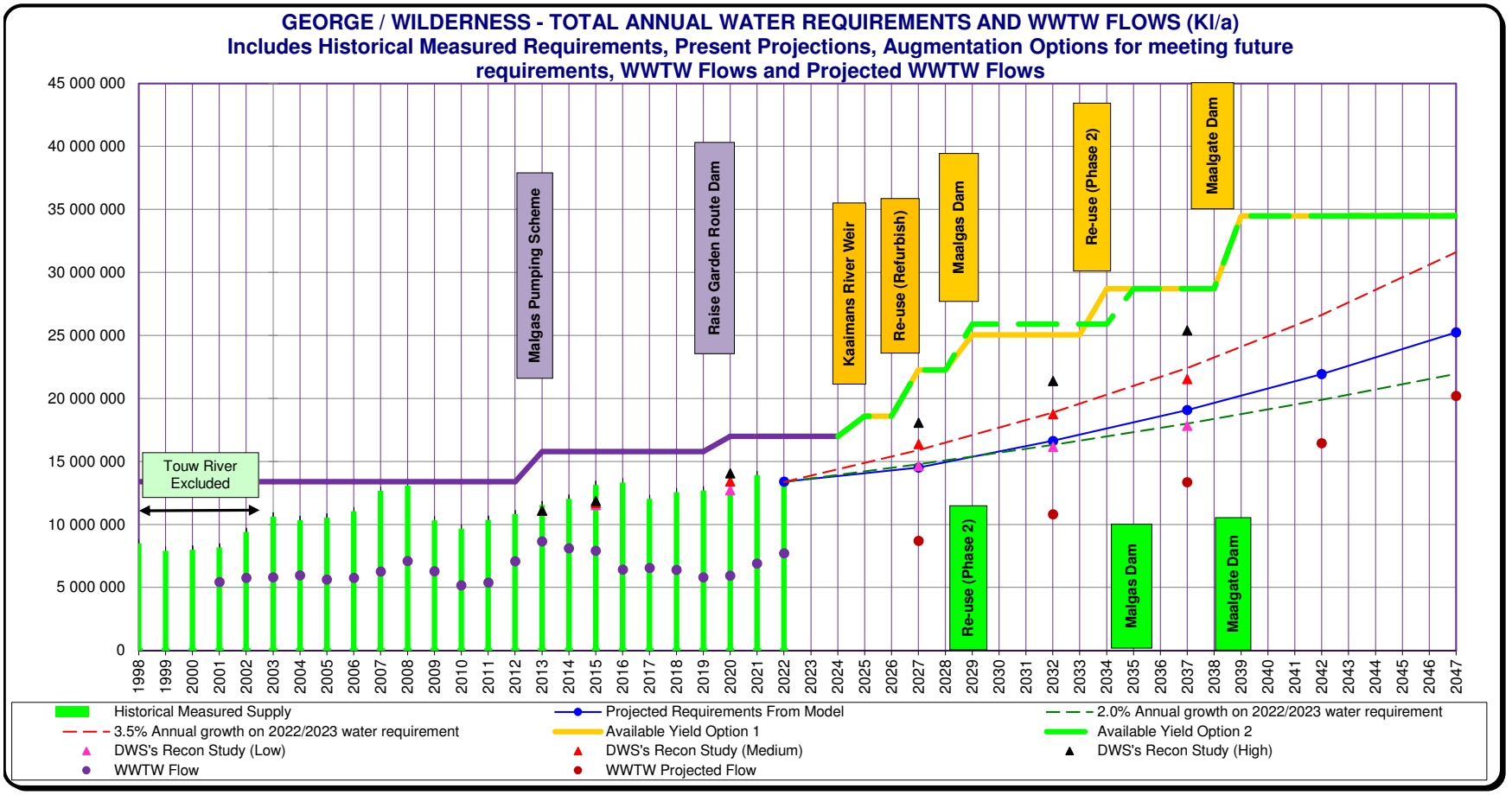
(H) - Peak Day Factor : Estimated

George Projected Water Demands								WWTW FLOWS AND POJECTIONS (Kl/a)		
Year *	Measured raw water requirements	Projected requirements from model	Other Projections					Metered Annual WWTW Flow	Percentage (WWTW Flow / System Input Volume)	Projected WWTW Flow
			2.0% Annual growth on 2022/2023 water requirement	3.5% Annual growth on 2022/2023 water requirement	DWS's All Towns Reconciliation Strategy (Apr. 2014)					
					Low	Medium	High			
1998	8 496 662									
1999	7 910 977									
2000	8 003 136									
2001	8 187 609							5 431 197	66.3%	
2002	9 407 027							5 765 316	61.3%	
2003	10 631 243							5 818 458	54.7%	
2004	10 359 494							5 957 513	57.5%	
2005	10 543 586							5 637 124	53.5%	
2006	11 052 890							5 755 203	52.1%	
2007	12 667 247							6 258 151	49.4%	
2008	13 084 369							7 104 955	54.3%	
2009	10 321 424							6 286 241	60.9%	
2010	9 660 182							5 177 227	53.6%	
2011	10 381 569							5 387 656	51.9%	
2012	10 821 776							7 090 495	65.5%	
2013	11 548 294				11 092 000	11 092 000	11 092 000	8 659 752	75.0%	
2014	12 049 853							8 102 176	67.2%	
2015	13 138 812				11 536 000	11 714 000	11 872 000	7 909 809	60.2%	
2016	13 343 270							6 422 060	48.1%	
2017	12 032 499							6 558 143	54.5%	
2018	12 572 241							6 410 282	51.0%	
2019	12 699 335							5 814 493	45.8%	
2020	12 546 113				12 725 000	13 428 000	14 070 000	5 932 028	47.3%	
2021	13 918 494							6 900 954	49.6%	
2022	13 379 668	13 404 987	13 379 668	13 379 668				7 717 956	57.7%	
2027		14 515 314	14 772 235	15 890 848	14 657 700	16 383 400	18 065 600		60.0%	8 709 188
2032		16 630 158	16 309 741	18 873 343	16 158 600	18 762 200	21 386 800		65.0%	10 809 602
2037		19 085 389	18 007 272	22 415 611	17 840 100	21 542 700	25 408 800		70.0%	13 359 773
2042		21 939 384	19 881 483	26 622 714					75.0%	16 454 538
2047		25 261 023	21 950 764	31 619 433					80.0%	20 208 818

Note: * The years in the above table refer to the Municipal Financial Years and is for the period July till June the following year. The measured demand for 2022 is therefore from July 2022 up to June 2023.

Group of Schemes for meeting future water demands of George				
Year	Group of schemes for meeting future demands		Alternative group of schemes for meeting future demands	
	Scheme	Available Yield Option 1	Scheme	Available Yield Option 2
1998	Garden Route Dam and Swartriver Dam	13 400 000	Garden Route Dam and Swart River Dam	13 400 000
1999		13 400 000		13 400 000
2000		13 400 000		13 400 000
2001		13 400 000		13 400 000
2002		13 400 000		13 400 000
2003		13 400 000		13 400 000
2004		13 400 000		13 400 000
2005		13 400 000		13 400 000
2006		13 400 000		13 400 000
2007		13 400 000		13 400 000
2008		13 400 000		13 400 000
2009		13 400 000		13 400 000
2010		13 400 000		13 400 000
2011		13 400 000		13 400 000
2012		13 400 000		13 400 000
2013	Malgas Pumping Scheme	15 800 000	Malgas Pumping Scheme	15 800 000
2014		15 800 000		15 800 000
2015		15 800 000		15 800 000
2016		15 800 000		15 800 000
2017		15 800 000		15 800 000
2018		15 800 000		15 800 000
2019		15 800 000		15 800 000
2020	Raise Garden Route Dam	17 000 000	Raise Garden Route Dam	17 000 000
2021		17 000 000		17 000 000
2022		17 000 000		17 000 000
2023		17 000 000		17 000 000
2024		17 000 000		17 000 000
2025	Kaaimans River Weir	18 600 000	Kaaimans River Weir	18 600 000
2026		18 600 000		18 600 000
2027	Re-use Treated Effluent (Refurbishment)	22 250 000	Re-use Treated Effluent (Refurbishment)	22 250 000
2028		22 250 000		22 250 000
2029	Malgas Dam	25 050 000	Re-use Treated Effluent (Ph2)	25 900 000
2030		25 050 000		25 900 000
2031		25 050 000		25 900 000
2032		25 050 000		25 900 000
2033		25 050 000		25 900 000
2034	Re-use Treated Effluent (Ph2)	28 700 000	Malgas Dam	25 900 000
2035		28 700 000		28 700 000
2036		28 700 000		28 700 000
2037		28 700 000		28 700 000
2038		28 700 000		28 700 000
2039	Maalgate Dam	34 500 000	Maalgate Dam	34 500 000
2040		34 500 000		34 500 000
2041		34 500 000		34 500 000
2042		34 500 000		34 500 000
2043		34 500 000		34 500 000
2044		34 500 000		34 500 000
2045		34 500 000		34 500 000
2046		34 500 000		34 500 000
2047		34 500 000		34 500 000
2043		34 500 000		34 500 000
2044		34 500 000		34 500 000
2045		34 500 000		34 500 000
2046		34 500 000		34 500 000
2047		34 500 000		34 500 000

Additional Yields	m³/a
Kaaimans River	1 600 000
Re-use of Treated Effluent (Refurbish)	3 650 000
Malgas Pumping Scheme	2 400 000
Raising Garden Route Dam	1 200 000
Malgas Dam (5 200 000)	2 800 000
Re-use of Treated Effluent (Phase 2)	3 650 000
Maalgate Dam	5 800 000


GEORGE / WILDERNESS - TOTAL ANNUAL WATER REQUIREMENTS AND WWTW FLOWS (Kl/a)
Includes Historical Measured Requirements, Present Projections, Augmentation Options for meeting future requirements, WWTW Flows and Projected WWTW Flows
45 000 000
40 000 000
35 000 000
30 000 000
25 000 000
20 000 000
15 000 000
10 000 000
5 000 000
0
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
Touw River Excluded
Malgas Pumping Scheme
Raise Garden Route Dam
Kaaimans River Weir
Re-use (Refurbish)
Maalgas Dam
Re-use (Phase 2)
Maalgate Dam
Re-use (Phase 2)
Malgas Dam
Maalgate Dam
Historical Measured Supply
Projected Requirements From Model
2.0% Annual growth on 2022/2023 water requirement
3.5% Annual growth on 2022/2023 water requirement
Available Yield Option 1
Available Yield Option 2
DWS's Recon Study (Low)
DWS's Recon Study (Medium)
DWS's Recon Study (High)
WWTW Flow
WWTW Projected Flow

Haarlem - Input Variables for Water Demand Model								
Parameter / Variable	Year	Income Categorization				Business[D]	Other[E]	Total
		High Income	Middle Income	Low Income	Sub- Total			
		Units are presented in brackets with the "Parameter Description" - First Column						
Population[A]	2022	622	1600	429	2651	-	-	-
	2027	630	1640	516	2786			
	2032	638	1681	609	2928			
	2037	646	1724	708	3078			
	2042	654	1767	813	3235			
	2047	662	1812	926	3400			
Growth (%/year)		Growth in Population				Growth in Demand		
	2022-2027	0.25%	0.50%	3.76%	1.00%	1%	1%	
	2027-2032	0.25%	0.50%	3.36%	1.00%	1%	1%	
	2032-2037	0.25%	0.50%	3.05%	1.00%	1%	1%	
	2037-2042	0.25%	0.50%	2.81%	1.00%	1%	1%	
	2042-2047	0.25%	0.50%	2.62%	1.00%	1%	1%	
Unit Demand (l/c/d)[B]	2022	155.0	105.0	75.0	-	-	-	-
Average Annual Daily Water Requirement (Kl/d - Water Losses Excluded)	2022	96	168	32	-	0.5	5.2	302
	2027	98	172	39		1	5	315
	2032	99	177	46		1	6	327
	2037	100	181	53		1	6	341
	2042	101	186	61		1	6	355
	2047	103	190	69		1	7	370
Water Losses (%) [C]	2022	40.4	40.4	40.4		40.4	40.4	-
	2027	35.0	35.0	35.0		35.0	35.0	
	2032	31.3	31.3	31.3		31.3	31.3	
	2037	27.5	27.5	27.5		27.5	27.5	
	2042	23.8	23.8	23.8		23.8	23.8	
	2047	20.0	20.0	20.0		20.0	20.0	
Average Annual Daily Water Requirement (Kl/d)	2022	162	282	54		1	9	507
	2027	150	265	60		1	8	484
	2032	144	257	66		1	8	476
	2037	138	250	73		1	8	470
	2042	133	243	80		1	8	465
	2047	128	238	87		1	8	462
Average Peak Month Daily Water Requirement (Kl/d)	2022	265	462	89		1	14	832
	2027	246	434	98		1	14	794
	2032	236	421	109		1	14	781
	2037	226	409	120		1	14	771
	2042	218	399	131		1	14	763
	2047	210	390	142		1	14	758
Peak Day Water Requirement (Kl/d)	2022	332	578	111		2	18	**1040**
	2027	308	543	122		2	17	**992**
	2032	295	526	136		2	17	**976**
	2037	283	512	150		2	17	**964**
	2042	272	499	164		2	17	**954**
	2047	263	488	178		2	17	**947**
Total Annual Water Requirement (Kl/year)	2022	59032	102854	19724		306	3185	**185102**
	2027	54808	96691	21751		295	3069	**176613**
	2032	52469	93725	24259		293	3050	**173797**
	2037	50380	91122	26739		292	3039	**171572**
	2042	48504	88828	29206		292	3037	**169868**
	2047	46812	86802	31675		293	3043	**168623**
Peak Month Factor[F]	1.64							
Peak Day Factor[G]	1.25							

Notes : → TO USE THIS SHEET, FILL IN THE VARIABLES IN THE SHADED BLOCKS ABOVE

References:

(A) - Projected population for 2022/2023 is based on the Census 2011 data and the estimated future population growth, as agreed with Municipality during January 2014.

(B) - Residential unit demands estimated.

(C) - Water Losses: Calculated water losses from July 2022 to June 2023. Estimated 5.4% reduction in water losses over the next five years.

(D) - Commercial and Industrial: Average calculated value from July 2022 to June 2023 treasury data for Haarlem Bus category, Code 1472 [kl/month]

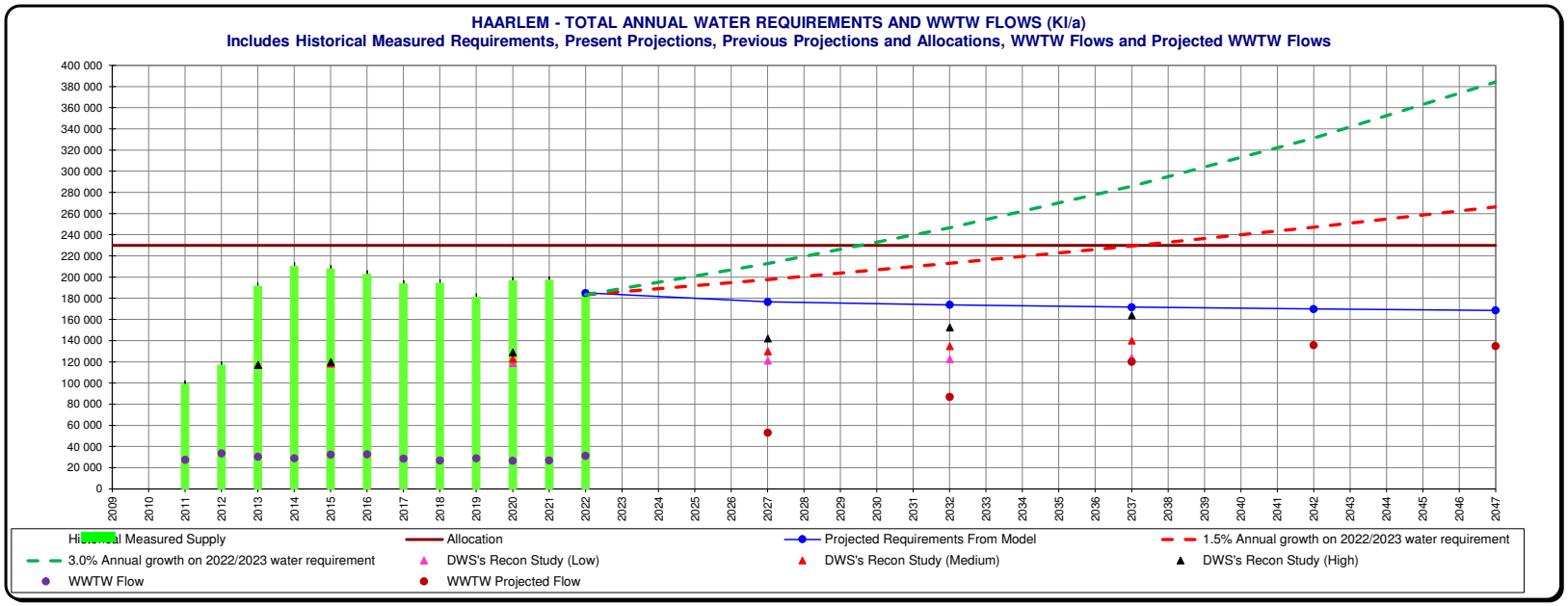
(E) - Others: Average calculated value from July 2022 to June 2023 treasury data for Haarlem Schools and Haarlem Churches categories, Codes 1474 and 1475 [kl/month]

(F) - Peak Month Factor: Maximum value calculated from July 2018 to June 2023 data.

(G) - Peak Day Factor : Estimated

Haarlem Projected Water Requirements and Allocations (Kl/year)									WWTW FLOWS AND POJECTIONS (Kl/a)		
Year *	Measured raw water requirements	Projected Demands from model	Other Projections					Haarlem Dam	Metered Annual WWTW Flow	Percentage (WWTW Flow / System Input Volume)	Projected WWTW Flow
			1.5% Annual growth on 2022/2023 water requirement	3.0% Annual growth on 2022/2023 water requirement	DWS's All Towns Reconciliation Strategy (Apr 2014)			Appelkloof Water Agreement			
					Low	Medium	High				
2009								230 000			
2010								230 000			
2011	99 241							230 000	27574	27.8%	
2012	117 250							230 000	33609	28.7%	
2013	191 801				117 000	117 000	117 000	230 000	30331	15.8%	
2014	210 763							230 000	29016	13.8%	
2015	208 222				118 000	119 000	120 000	230 000	32267	15.5%	
2016	203 230							230 000	32823	16.2%	
2017	194 084							230 000	28482	14.7%	
2018	194 853							230 000	26937	13.8%	
2019	181 530							230 000	28864	15.9%	
2020	197 042				119 000	123 000	129 000	230 000	26542	13.5%	
2021	197 550							230 000	26935	13.6%	
2022	183 480	185 102	183 480	183 480				230 000	31131	17.0%	
2027		176 613	197 660	212 704	121 100	130 000	142 300	230 000		30%	52 984
2032		173 797	212 936	246 582	122 600	135 000	152 600	230 000		50%	86 898
2037		171 572	229 393	285 856	124 100	140 000	164 100	230 000		70%	120 101
2042		169 868	247 121	331 385				230 000		80%	135 894
2047		168 623	266 219	384 166				230 000		80%	134 899

Note: * The years in the above table refer to the Municipal Financial Years and is for the period July till June the following year. The measured demand for 2022 is therefore from July 2022 up to June 2023



Uniondale - Input Variables for Water Demand Model								
Parameter / Variable	Year	Income Categorization				Business[D]	Other[E]	Total
		High Income	Middle Income	Low Income	Sub- Total			
		Units are presented in brackets with the "Parameter Description" - First Column						
Population[A]	2022	697	4423	817	5937	-	-	-
	2027	733	4884	1101	6717			
	2032	770	5392	1438	7600			
	2037	809	5953	1837	8599			
	2042	851	6573	2306	9729			
	2047	894	7257	2857	11007			
Growth (%/year)		Growth in Population				Growth in Demand		
	2022-2027	1.00%	2.00%	6.15%	2.50%	1%	1%	
	2027-2032	1.00%	2.00%	5.49%	2.50%	1%	1%	
	2032-2037	1.00%	2.00%	5.01%	2.50%	1%	1%	
	2037-2042	1.00%	2.00%	4.65%	2.50%	1%	1%	
	2042-2047	1.00%	2.00%	4.38%	2.50%	1%	1%	
Unit Demand (l/c/d)[B]	2022	120.0	70.0	60.0	-	-	-	-
Average Annual Daily Water Requirement (Kl/d - Water Losses Excluded)	2022	84	310	49	-	79.3	18.9	540
	2027	88	342	66		83	20	599
	2032	92	377	86		88	21	665
	2037	97	417	110		92	22	738
	2042	102	460	138		97	23	820
	2047	107	508	171		102	24	913
Water Losses (%) [C]	2022	39.3	39.3	39.3		39.3	39.3	-
	2027	35.0	35.0	35.0		35.0	35.0	
	2032	30.0	30.0	30.0		30.0	30.0	
	2037	25.0	25.0	25.0		25.0	25.0	
	2042	20.0	20.0	20.0		20.0	20.0	
	2047	15.0	15.0	15.0		15.0	15.0	
Average Annual Daily Water Requirement (Kl/d)	2022	138	510	81		131	31	890
	2027	135	526	102		128	31	922
	2032	132	539	123		125	30	949
	2037	129	556	147		123	29	984
	2042	128	575	173		121	29	1025
	2047	126	598	202		120	29	1074
Average Peak Month Daily Water Requirement (Kl/d)	2022	179	663	105		170	40	1158
	2027	176	684	132		167	40	1198
	2032	172	701	160		163	39	1234
	2037	168	722	191		160	38	1279
	2042	166	748	225		157	37	1333
	2047	164	777	262		156	37	1396
Peak Day Water Requirement (Kl/d)	2022	224	829	131		212	51	**1447**
	2027	220	855	165		208	50	**1498**
	2032	214	876	200		203	48	**1543**
	2037	210	903	239		199	48	**1599**
	2042	207	935	281		197	47	**1666**
	2047	205	971	328		194	46	**1745**
Total Annual Water Requirement (Kl/year)	2022	50296	186183	29475		47685	11365	**325003**
	2027	49365	191962	37103		46801	11154	**336386**
	2032	48177	196803	44998		45675	10886	**346539**
	2037	47259	202801	53627		44805	10679	**359170**
	2042	46565	209914	63116		44147	10522	**374265**
	2047	46062	218129	73599		43670	10408	**391868**
Peak Month Factor[F]	1.30							
Peak Day Factor[G]	1.25							

Notes : → TO USE THIS SHEET, FILL IN THE VARIABLES IN THE SHADED BLOCKS ABOVE

References:

(A) - Projected population for 2022/2023 is based on the Census 2011 data and the estimated future population growth, as agreed with Municipality during January 2014.

(B) - Residential unit demands estimated.

(C) - Water Losses: Calculated water losses from July 2022 to June 2023. Estimated 4.3% reduction in water losses over the next five years.

(D) - Commercial and Industrial: Average calculated value from July 2022 to June 2023 treasury data for Uniondale Bus category, Code 1452 [kl/month]

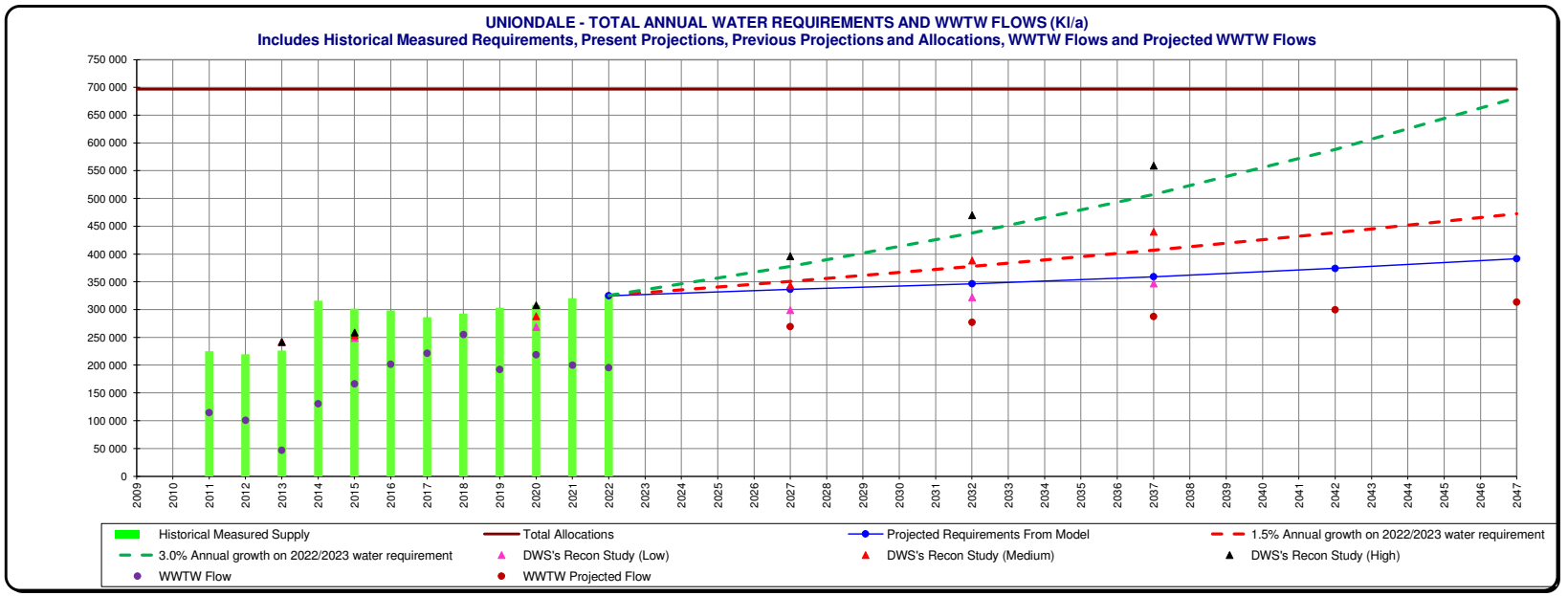
(E) - Others: Average calculated value from July 2022 to June 2023 treasury data for Uniondale Mun (1410), Uniondale Schools (1454) and Uniondale Churches (1455) categories [kl/month]

(F) - Peak Month Factor: Maximum value calculated from July 2018 to June 2023 data.

(G) - Peak Day Factor : Estimated

Uniondale Projected Water Requirements and Allocations (Kl/year)											WWTW FLOWS AND POJECTIONS (Kl/a)		
Year *	Measured raw water requirements	Projected requirements from model	Other Projections					Allocations			Metered Annual WWTW Flow	Percentage (WWTW Flow / System Input Volume)	Projected WWTW Flow
			1.5% Annual growth on 2022/2023 water requirement	3.0% Annual growth on 2022/2023 water requirement	DWS's All Towns Reconciliation Strategy (Apr 2014)			Kammanassie River	Haarlem Dam				
					Low	Medium	High	According to Eden Bulk Water Master Plan	Appelkloof Water Agreement	Total			
2009								567 000	130 000	697 000			
2010								567 000	130 000	697 000			
2011	225 103							567 000	130 000	697 000	114313	50.8%	
2012	219 840							567 000	130 000	697 000	100684	45.8%	
2013	226 366				242 000	242 000	242 000	567 000	130 000	697 000	46771	20.7%	
2014	316 304							567 000	130 000	697 000	130582	41.3%	
2015	301 614				249 000	254 000	259 000	567 000	130 000	697 000	166037	55.0%	
2016	298 451							567 000	130 000	697 000	201273	67.4%	
2017	286 582							567 000	130 000	697 000	221426	77.3%	
2018	292 995							567 000	130 000	697 000	254761	87.0%	
2019	303 247							567 000	130 000	697 000	192320	63.4%	
2020	308 454				269 000	288 000	308 000	567 000	130 000	697 000	218645	70.9%	
2021	320 313							567 000	130 000	697 000	199685	62.3%	
2022	325 616	325 003	325 616	325 616				567 000	130 000	697 000	195412	60.0%	
2027		336 386	350 781	377 478	299 100	344 000	396 200	567 000	130 000	697 000		80%	269 109
2032		346 539	377 890	437 600	322 000	388 600	469 800	567 000	130 000	697 000		80%	277 232
2037		359 170	407 095	507 299	347 000	440 100	559 300	567 000	130 000	697 000		80%	287 336
2042		374 265	438 557	588 098				567 000	130 000	697 000		80%	299 412
2047		391 868	472 451	681 767				567 000	130 000	697 000		80%	313 494

Note: * The years in the above table refer to the Municipal Financial Years and is for the period July till June the following year. The measured demand for 2022 is therefore from July 2022 up to June 2023



	Ammonia	Nitrites & Nitrates	COD	Ortho-Phosphate	Ammonia	Nitrites & Nitrates	COD	Ortho-Phosphate	Ammonia	Nitrites & Nitrates	COD	Ortho-Phosphate	Overall
Outeniqua	47	47	47	47	35	47	12	46	**74.5%**	**100.0%**	**25.5%**	**97.9%**	**74.5%**
Gwaing	49	48	49	49	48	48	46	48	**98.0%**	**100.0%**	**93.9%**	**98.0%**	**97.4%**
Kleinkrantz	50	49	50	50	50	49	36	44	**100.0%**	**100.0%**	**72.0%**	**88.0%**	**89.9%**
Herolds Bay	49	47	49	49	N/A	N/A	49	N/A	**N/A**	**N/A**	**100.0%**	**N/A**	**100.0%**
Uniondale	51	49	51	51	N/A	N/A	51	N/A	**N/A**	**N/A**	**100.0%**	**N/A**	**100.0%**
Haarlem	51	47	51	51	N/A	N/A	51	N/A	**N/A**	**N/A**	**100.0%**	**N/A**	**100.0%**
Total	**297**	**287**	**297**	**297**	**133**	**144**	**245**	**138**	**91.1%**	**100.0%**	**82.5%**	**94.5%**	**90.0%**

	pH	Electrical Conductivity	Suspended Solids	pH	Electrical Conductivity	Suspended Solids	pH	Electrical Conductivity	Suspended Solids	Overall
Outeniqua	47	47	47	47	8	29	**100.0%**	**17.0%**	**61.7%**	**59.6%**
Gwaing	49	49	49	49	34	49	**100.0%**	**69.4%**	**100.0%**	**89.8%**
Kleinkrantz	50	50	50	50	50	49	**100.0%**	**100.0%**	**98.0%**	**99.3%**
Herolds Bay	49	49	49	48	49	N/A	**98.0%**	**100.0%**	**N/A**	**99.0%**
Uniondale	51	51	51	50	51	N/A	**98.0%**	**100.0%**	**N/A**	**99.0%**
Haarlem	51	51	51	51	51	N/A	**100.0%**	**100.0%**	**N/A**	**100.0%**
Total	**297**	**297**	**297**	**295**	**243**	**127**	**99.3%**	**81.8%**	**87.0%**	**89.9%**

Industrial Samples taken at the various Industrial consumers and analysed at George Municipality's Laboratory

Industrial Consumer 1

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	8.18	10.45	9.16	10.35	8.87	8.81	7.12	6.79	6.4	8.45	6.56	9.25	9.23	6.55	6.89	7.52	10.5	6.89	10.09	9.72	7.57	8.53			9.57	6.49	9.39	9.9	5.84	10.64	5.34	10.96	5.69	6.8	8.26	5.82	11.6	6.34	5.05		4.61	5.66	11.97	10.49	4.43	5.65	8.92	6.25	45	27	60.0%	6 - 10 General Limit
Chemical Oxygen Demand mg/l	7230	4930	4295	7710	5655	8870	4755	6430	7535	7710	4695	7215	5655	6410	9030	6975	6535	6175	5105	6545	6245	6645			5085	6960	6275	6890	6850	7330	5815	8045	6975	7790	7190	6175	6410	3825	8085		8390	7120	4980	6170	10025	10840	18410	5170	45	0	0.0%	3000 General Limit
Electrical Conductivity	226	383	324	511	352	458	349	322	167.4	369	360	374	468	305	342	282	193.5	271	288	293	309	393			956	208	245	250	310	345	266	775	313	128.3	232	292	301	218	352		271	265	373	241	339	251	254	269	45	10	22.2%	250 General Limit
Caustic Alkalinity (CaCO3)	440	650	580	540	320	475	750	300	400	750	750	950	650	4580	510	730	640	600	420	1200	500	600			380	220	660	650	7200	600	360	640	360	380	500	500	900	400	380		640	360	620	600	140	300	600	540	45	43	95.6%	2000 General Limit
Chloride (CR)	700	730	900	640	890	2500	750	1000	550	1000	950	1050	720	580	780	420	430	560	480	940	420	1000			1700	320	340	400	280	480	300	120	1000	1320	1040	500	660	460	660		920	440	600	340	400	420	540	500	45	40	88.9%	1000 General Limit
Settable Solids (60 minutes)	10	20	10	40	5	7	2	2	10	15	20	10	10	1	7	6	2	10	20	2	5	5			10	10	10	15	15	15	18	30	10	10	10	15	5	15	35		10	20	15	20	60	10	20	15	45	44	97.8%	50 General Limit
Suspended Solids mg/l	3918	2073	1881	3569	4422	4792	1882	2002	4849	3830	2216	5490	3295	3111	6259	3598	3653	3917	241	3205	5145	3905			924	1207	73	536	909	1075	1222	1184	1227	1417	1148	1267	1653	537	1220		7207	6442	1380	1390	2470	3058	4872	774	45	7	15.6%	1000 Limit
Total Dissolved Solids (105° C)	1469	2490	2106	3322	2288	2977	2269	2093	1088	2399	2340	2431	3042	1983	2223	1833	1258	1762	1872	1905	2009	2555			5564	1352	1593	1625	2015	2243	1729	5038	2035	834	1508	1898	1957	1417	2288		1762	1723	2425	1567	2060	1608	1635	1683	45	43	95.6%	4000 General Limit

Industrial Consumer 2

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH																																					8.21	7.87											2	2	100.0%	6 - 10
Chemical Oxygen Demand mg/l																																					5125	5675											2	0	0.0%	3000
Electrical Conductivity																																					6550	5890											2	0	0.0%	250
Caustic Alkalinity (CaCO3)																																					2700	4000											2	0	0.0%	2000
Chloride (CR)																																					600	700											2	2	100.0%	1000
Settable Solids (60 minutes)																																					3	5											2	2	100.0%	50
Suspended Solids mg/l																																					64366	70257											2	0	0.0%	1000
Total Dissolved Solids (105° C)																																					42575	38285											2	0	0.0%	4000

Industrial Consumer 3

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	7.25	7.12	6.82	7.3	7.22	7.5	7.69	7.24	7.16	6.86	6.98	7.6	6.83	7.28	7.28	7.07	8.09	7.38	7.01	7.14	7.19	7.77	7.27		7.34	7.16	6.86	6.75	7.02	7.01	6.66	6.88	7.19	7.03	5.85	5.47	5.76	6.93	6.59		7.21	7.48	7.98	7.04	6.50	6.79	7.02	7.23	46	43	93.5%	6 - 10
Chemical Oxygen Demand mg/l	760	760	695	725	570	780	450	1270	895	945	1580	55	690	485	525	370	670	275	950	310	950	740	280		595	290	725	825	48	440	640	547	87	513	1274	642	700	166	798		620	160	715	105	305	1525	3930	185	46	45	97.8%	3000
Electrical Conductivity	117	124.1	113.5	87.6	104.4	103.6	80.8	72.1	102.5	66.1	74.5	23.9	112.8	110.4	98.2	74	89.5	92.9	81.3	79.1	89.2	119	94.5		83.6	92.8	80.3	66.1	91.2	49.1	464	99.9	37.8	41.5	125.4	95.1	120.5	114.2	97.5		152.1	48.2	74.3	34.6	29.8	190.3	92.3	49.5	46	45	97.8%	250
Caustic Alkalinity (CaCO3)	660	380	380	240	450	200	450	250	230	300	450	200	550	280	550	250	300	500	250	340	460	100	320		200	360	340	620	280	200	220	380	240	320	400	260	420	400	280		420	200	240	200	140	60	400	280	46	46	100.0%	2000
Chloride (CR)	400	90	280	200	150	150	250	150	250	200	300	150	600	160	300	130	300	300	170	200	320	1400	160		160	260	160	220	140	120	200	120	200	320	420	200	360	320	160		500	100	400	200	80	40	120	140	46	45	97.8%	1000
Settable Solids (60 minutes)	10	1	10	5	4	3	2	2	4	10	5	5	3	2	1	7	3	10	3	5	3	5	4		2	1	10	2	10	1	1	4	2	12	5	2	5	2	1		2	4	10	1	5	30	10	1	46	46	100.0%	50
Suspended Solids mg/l	513	228	55	88	45	24	455	519	345	79	265	10106	170	169	86	7	490	31	1328	18762	147	31	62		217	367	25	201	0	144	96	48	110	60	660		421	186	80	700	70	502	2240	44	46	42	91.3%	1000
Total Dissolved Solids (105° C)	761	807	738	569	679	673	525	469	666	429.65	484.25	155.35	733.2	718	638	481	582	604	528	514	580	774	614		543	603	522	430	593	319	3016	649	246	270	815	618	783	742	634		989	313	483	225	191	122	591	317	46	46	100.0%	4000

Industrial Consumer 4

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	6.24	7.01	6.96	7.61	8.99	6.8	7.35	7.21	7.75	6.46	3.64	4.56	6.57	7.65	7.01	6.6	7.33	6.54	6.63	7.58	6.64	5.11	7.4	6.96	6.76	6.6	6.98	5.32	7.09	7.54	7.22	6.72	7.16	6.92	6.43	6.24	5.8	6.41	6.74	6.46		7.55	6.71	4.26	4.94	6.42	5.65	6.9	6.84	48	40	83.3%	6 - 10
Chemical Oxygen Demand mg/l	9825	3285	4030	2415	675	3435	1945	315	700	3180	2715	1940	2590	685	1430	2410	10740	2070	7670	375	2280	1470	2135	2590	1745	3865	5280	1860	3070	645	1505	1605	2505	1768	1990	324	654	2690	3370	1760		141	1535	8610	3205	4370	1605	2720	1859	48	34	70.8%	3000
Electrical Conductivity	325	283	552	423	133	1018	200	51.2	157.2	200	506	473	1423	474	1328	1756	2130	1331	671	151.6	536	781	537	998	401	474	958	531	1826	105.1	161.5	1686	1018	764	323	40.7	87.9	516	293	107		95.2	153.5	401	179	2190	1835	408	566.0	48	15	31.3%	250
Caustic Alkalinity (CaCO3)	1400	140	560	440	160	190	800	140	130	300	350	100	600	200	200	180	1650	400	900	300	420	360	550	420	160	240	840	200	520	320	200	240	340	320	300	160	200	400	360	200		240	200	840	260	460	100	200	300	48	42	100.0%	2000
Chloride (CR)	2000	590	1940	1080	380	3320	500	160	800	650	1800	2000	4900	1180	560	6940	6700	5200	2090	620	2300	460	1450	2700	1200	440	1450	1580	3740	260	440	460	3600	2340	5220	380	200	1900	1040	300		640	400	600	420	800	500	1300	2200	48	22	45.8%	1000
Settable Solids (60 minutes)	20	15	15	130	3	5	3	1	1	10	30	5	5	4	1	4	10	5	30	2	2	50	5	15	5	8	10	5	30	5	10	10	2	10	40	2	5	5	15	1		2	1	20	10	5	1	13	1	48	47	97.9%	50
Suspended Solids mg/l	7785	2343	1191	1466	361	717	404	82	89	2470	1022	2668	8818	305	299	6305	22444	378	4381	293	617	539	1150	783	55	791	2846	80	10499	94	623	247	546	418	590	11	260	180	473	1758		491	1936	840	970	1600	375	192	332	48	31	64.6%	1000
Total Dissolved Solids (105° C)	2113	1840	3588	2750	865	6617	1300	333	1022	1300	3289	3075	9250	3081	8632	11414	13845	8652	4362	985	3484	5077	3491	6487	2607	3081	6227	3452	11869	683	1050	10959	6617	4966	2100	265	571	3354	1905	696		619	998	2607	1164	13870	1180	2620	3590	48	33	68.8%	4000

Industrial Consumer 5

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	10.14	9.01	7.3	8.51	9.5	9.81	8.15	8.06	7.69	8.87	9.2	8.97		9.44	9.71	8.69	7.88	7.81	7.14	9.21	8.74	7.55	7.81		8.69	7.45	7.21		7.96	7.81	7.52	7.23	7.24	7.59	6.38	7.7	8.81	8.63	8.89		9.57	9.00	9.68	7.71	9.42	8.58	10.43	8.43	44	42	95.5%	6 - 10
Chemical Oxygen Demand mg/l	615	3120	700	625	235	375	325	65	345	315	605	150		150	115	205	265	1645	610	670	720	205	170		580	655	670		2740	385	345	189	242	288	253	191	169	483	207		214	190	130	233	196	106	221	311	44	43	97.7%	3000
Electrical Conductivity	372	193.4	118.5	161.6	242	179.6	143.3	99.8	465	343	198.5	1461		223	124.2	136	146.4	247	158.6	431	1700	235	69.7		275	191.7	266		345	1764	315	317	198.9	75.6	174	154.2	137.4	74.2	730		340	115.9	151.8	137.4	154.8	77.2	243	791	44	29	65.9%	250
Caustic Alkalinity (CaCO3)	340	130	260	200	170	160	400	150	100	200	400	300		150	350	180	200	450	180	420	200	200			180	320	46		200	220	240	200	240	200	260	220	400	260	160		360	120	200	240	240	100	400	160	44	44	100.0%	2000
Chloride (CR)	1890	360	580	580	700	470	350	350	1850	1200	750	5900		720	650	260	410	700	770	1080	760	700	400		820	520	920		900	160	680	960	1000	1200	1100	500	460	360	3100		1700	300	800	400	400	200	400	3340	44	34	77.3%	1000
Settable Solids (60 minutes)	15	25	5	10	10	2	3	1	3	5	10	5		1	1	3	5	5	12	1	1	5	5		5	13	5		5	1	1	1	5	1	5	1	5	1	2		3	1	5	1	5	1	10	1	44	44	100.0%	50
Suspended Solids mg/l	421	1831	92	281	415	278	101	35	473	357	9	9114		377	161	60	24	1898	393	310	44	73	70		350	186	391		36	385	65	63	7	150	30	164	577	0	157		1567	737	25	20	20	10	228	82	44	40	90.9%	1000
Total Dissolved Solids (105° C)	2418	1257	770	1050	1573	1167	931	649	3023	2229.5	1290.25	9496.5		1450	807	884	952	1606	1031	2802	11050	1528	453		1788	1246	1729		2243	11466	2048	2061	1293	491	1131	1002	893	482	4745		2210	753	987	893	981	494	1540	5100	44	39	88.6%	4000

Industrial Consumer 6

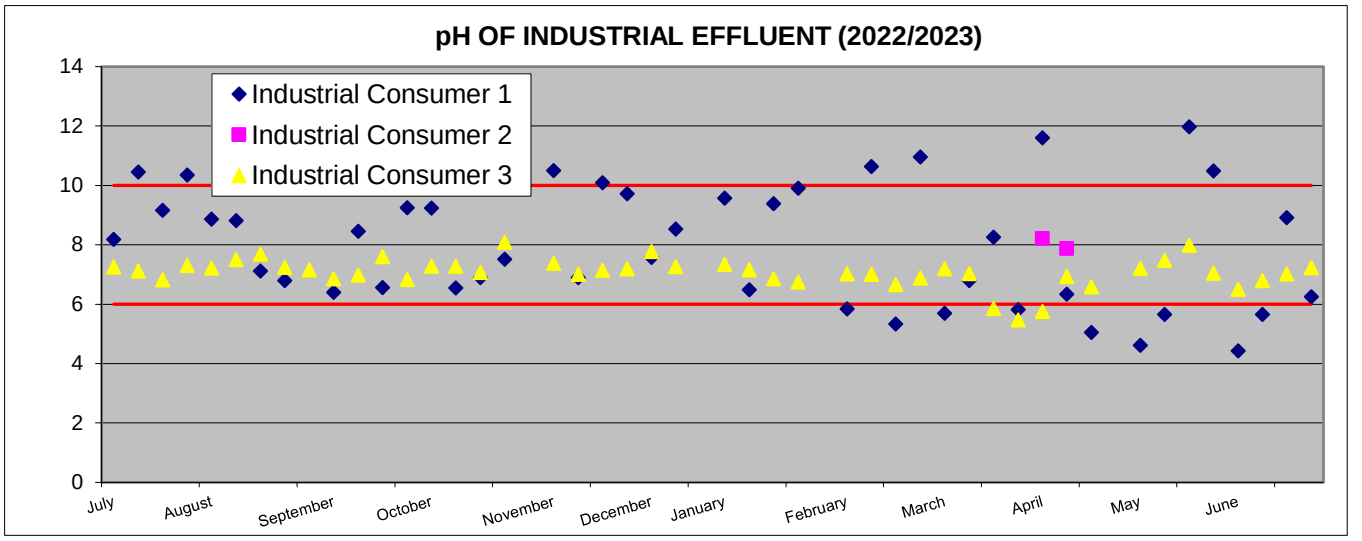
Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	6.64	5.97	7.16	6.68	6.4	6.97	6.82	6.27	6.09	5.82	7.73	6.45	5.87	9.14	7.43	6.24	6.49	6.22	6.54	6.51	6.1	6.29	7.01		6.65	6.52	6.42	6.27	7.86	6.53	5.95	6.18	6.3	6.69	5.79	5.44	5.76	5.96	5.88		6.03	7.28	6.94	6.7	8.86	6.57	6.73	6.17	46	37	80.4%	6 - 10
Chemical Oxygen Demand mg/l	1065	560	645	3465	2070	2695	3085	2675	6960	3625	4615	2020	7990	2990	225	2940	4895	2525	2660	3005	4325	2310	1805		3905	3235	4670	8275	100	8185	9340	3314	2493	3375	8385	9640	3710	8295	9700		3295	3870	3560	6240	1720	1002	1247	2355	46	20	43.5%	3000
Electrical Conductivity	51.8	211	33.9	76.1	126.9	180.5	149.4	144.5	272	126.8	183.5	86.3	202	255	30.1	203	282	202	131.8	151.5	351	282	167.7		260	310	306	301	178.9	199.1	346	425	373	69.9	268	356	182	239	272		17.1	73.5	84.8	306.0	87.5	67.8	77.2	73.8	46	30	65.2%	250
Caustic Alkalinity (CaCO3)	240	350	240	360	240	230	1350	430	1000	450	1000	600	850	960	300	670	540	400	620	1000	1500	400	600		360	460	620	2440	1000	600	920	780	1400	460	1200	1800	1200	1540	600		500	380	400	360	340	180	200	500	46	45	97.8%	2000
Chloride (CR)	280	370	240	240	180	360	300	230	540	400	750	200	550	320	300	270	600	600	260	360	780	500	400		480	420	260	280	260	200	500	400	540	560	800	360	260	200	600		580	60	400	680	120	100	140	160	46	46	100.0%	1000
Settable Solids (60 minutes)	10	5	5	10	8	3	4	3	2	5	15	20	80	5	4	4	20	60	15	15	400	5	5		6	5	20	85	5	45	70	30	70	20	60	80	10	80	250		5	15	10	25	2	2	10	10	46	36	78.3%	50
Suspended Solids mg/l	202	334	99	1670	862	84	1413	1337	3703	1226	3007	1299	3652	1250	155	1583	3124	2077	1685	892	14520	1054	1212		1447	1062	2428	4472	334	1879	4897	1530	3547	4152	4382	2561	990	3237	10935		2506	3206	6885	620	320	332	228	352	46	15	32.6%	1000
Total Dissolved Solids (105° C)	337	1372	220	495	825	1173	971	939	1768	824.2	1192.75	560.95	1313	1658	196	1320	1833	1313	857	985	2282	1833	1090		145	2015	1989	1957	1163	1294	2249	2763	2425	454	1742	2314	1183	1554	1768		111	478	551	1989	559	433	491	479	46	46	100.0%	4000

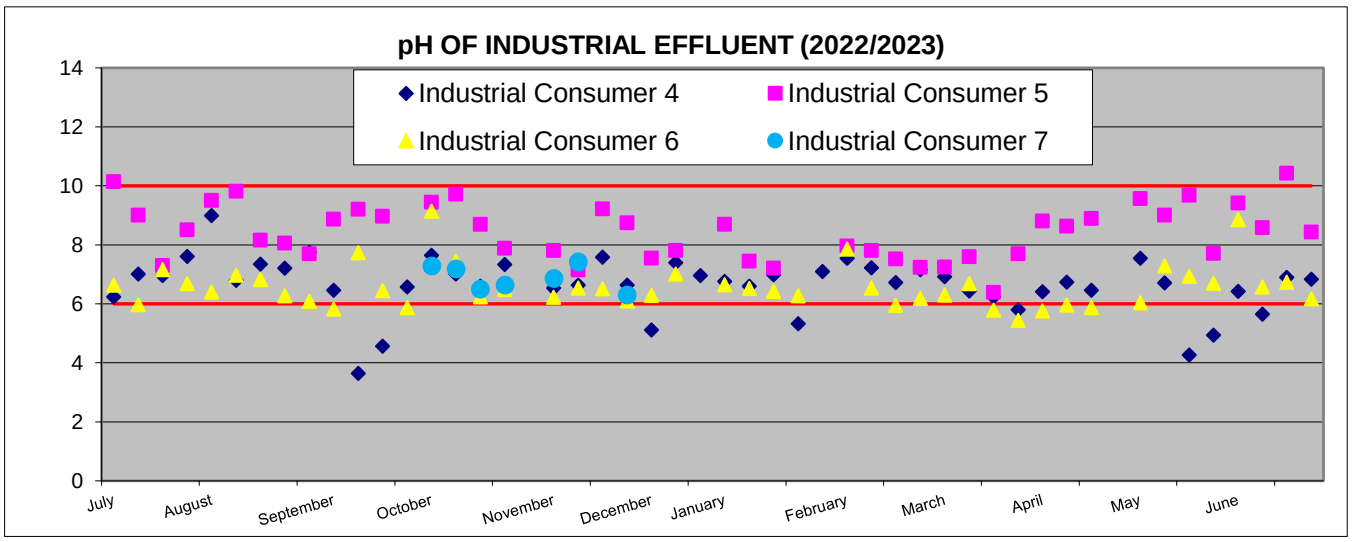
Industrial Consumer 7

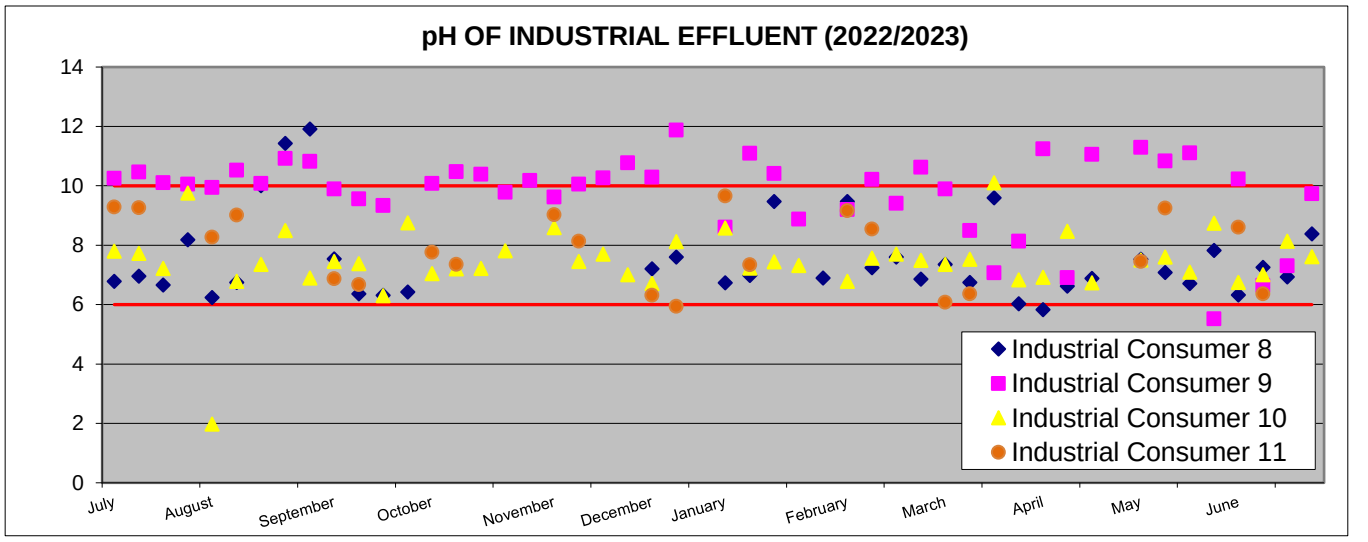
Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH													7.29	7.19	6.5	6.64	6.86	7.43	11.26	6.3																													8	7	87.5%	6 - 10
Chemical Oxygen Demand mg/l													1330	1015	1205	1965	765	580	2140	1965																													8	8	100.0%	3000
Electrical Conductivity													2620	495	663	148.7	298	334	521	585																													8	1	12.5%	250
Caustic Alkalinity (CaCO3)													120	450	160	320	300	140	840	440																													8	8	100.0%	2000
Chloride (CR)													1054	1900	2250	390	1200	1150	1080	2260																													8	1	12.5%	1000
Settable Solids (60 minutes)													6	6	4	8	10	10	15	44																													8	8	100.0%	50
Suspended Solids mg/l													851	180	383	28326	188	122	736	40666																													8	6	75.0%	1000
Total Dissolved Solids (105° C)													17039	3218	4310	967	1937	2171	3387	3803																													8	6	75.0%	4000

Industrial Consumer 8

Parameter	July				August				September				October				November				December				January				February				March				April				May				June				No of Samples	No of samples Complying	% Compliance	Requirement
pH	6.78	6.96	6.66	8.19	6.24	6.75	10	11.43	11.91	7.54	6.36	6.32	6.43									7.2	7.6		6.74	6.98	9.47	6.9	9.47	7.24	7.6	6.86	7.35	6.75	9.6	6.03	5.83	6.62	6.88		7.53	7.08	6.71	7.83	6.33	7.25	6.93	8.38	38	35	92.1%	6 - 10
Chemical Oxygen Demand mg/l	1720	910	1765	975	1230	3555	775	1190	1835	2220	935	260	1620									2735	3815		1290	1080	815	695	1700	1435	605	537	727	1116	500	713	1393	5420	2695		688	3780	1535	610	1290	590	5560	905	38	33	86.8%	3000
Electrical Conductivity	364	565	8.9	81.2	115.3	488	237	357	531	117	173.5	491	286									400	710		1036	201	71.3	45.9	589	148.7	275	199.7	288	95.2	96.1	67.1	266	193	389		242	468	154	88	62	49	575	190	38	21	55.3%	250
Caustic Alkalinity (CaCO3)	300	100	300	240	130	200	300	610	1200	200	800	200	450									600	1600		200	210	200	400	800	200	200	160	380	300	400																		


pH OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 1
Industrial Consumer 2
Industrial Consumer 3
14
12
10
8
6
4
2
0
July
August
September
October
November
December
January
February
March
April
May
June


pH OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 4
Industrial Consumer 5
Industrial Consumer 6
Industrial Consumer 7
14
12
10
8
6
4
2
0
July
August
September
October
November
December
January
February
March
April
May
June


pH OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 8
Industrial Consumer 9
Industrial Consumer 10
Industrial Consumer 11
14
12
10
8
6
4
2
0
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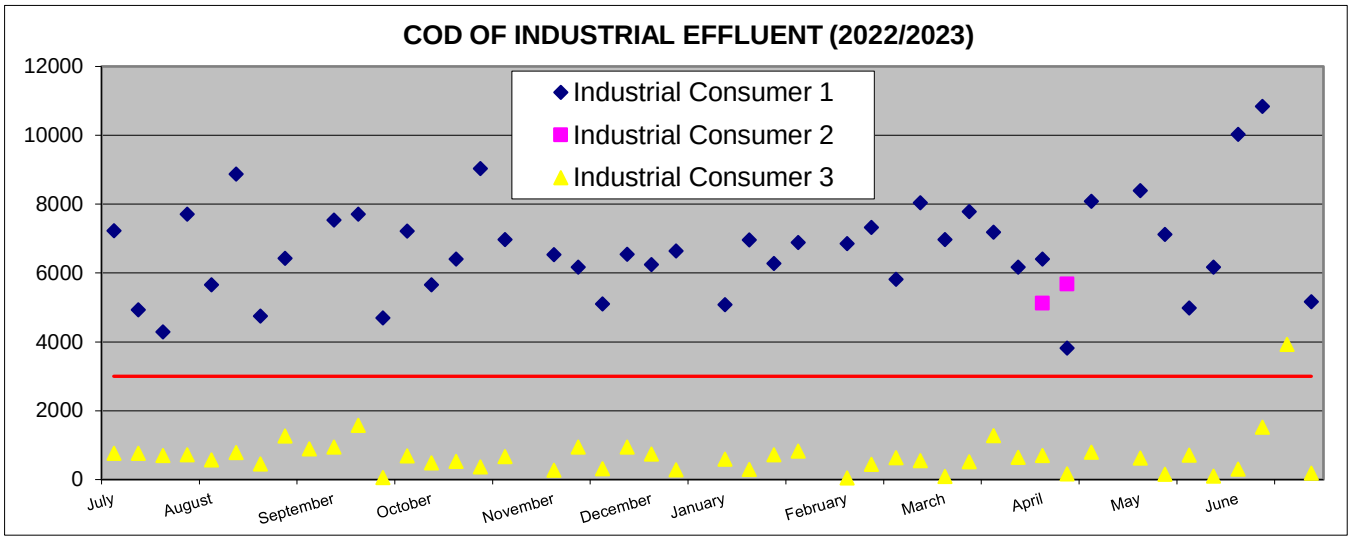
August
September
October
November
December
January
February
March
April
May
June


COD OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 1
Industrial Consumer 2
Industrial Consumer 3
12000
10000
8000
6000
4000
2000
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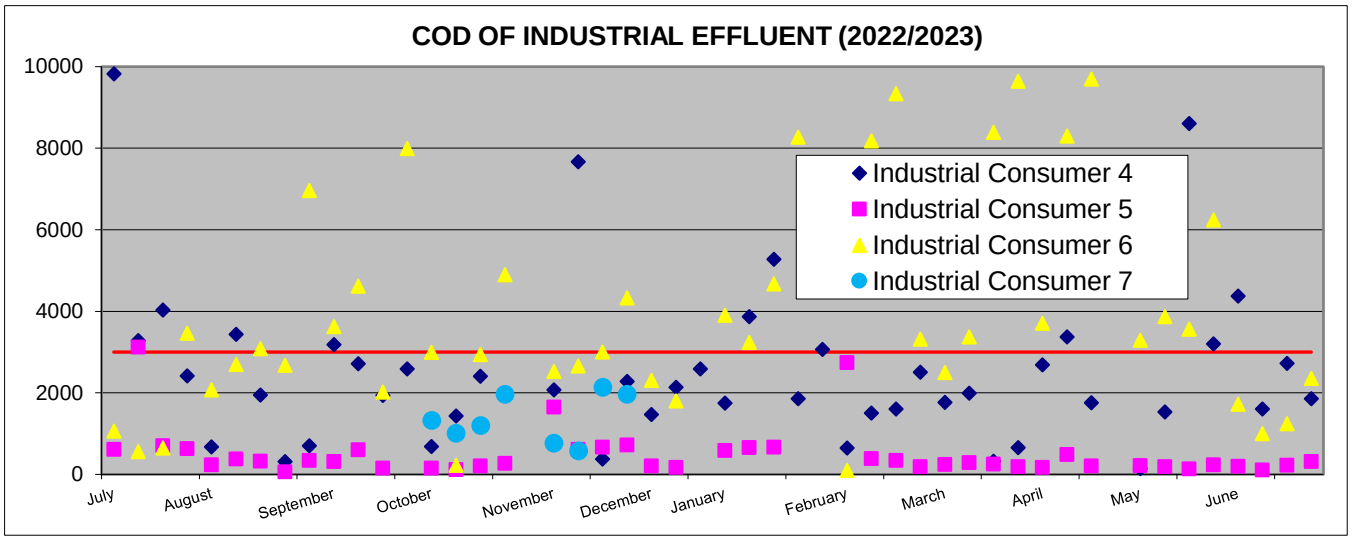
July
August
September
October
November
December
January
February
March
April
May
June


COD OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 4
Industrial Consumer 5
Industrial Consumer 6
Industrial Consumer 7
10000
8000
6000
4000
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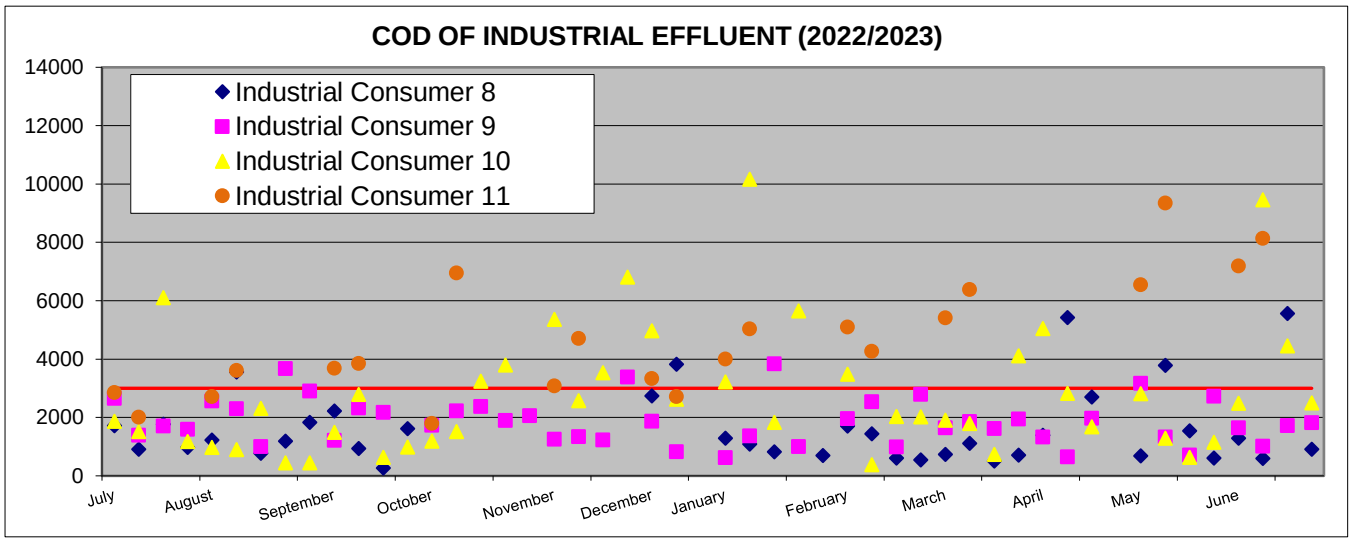
March
April
May
June


COD OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 8
Industrial Consumer 9
Industrial Consumer 10
Industrial Consumer 11
14000
12000
10000
8000
6000
4000
2000
0
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August
September
October
November
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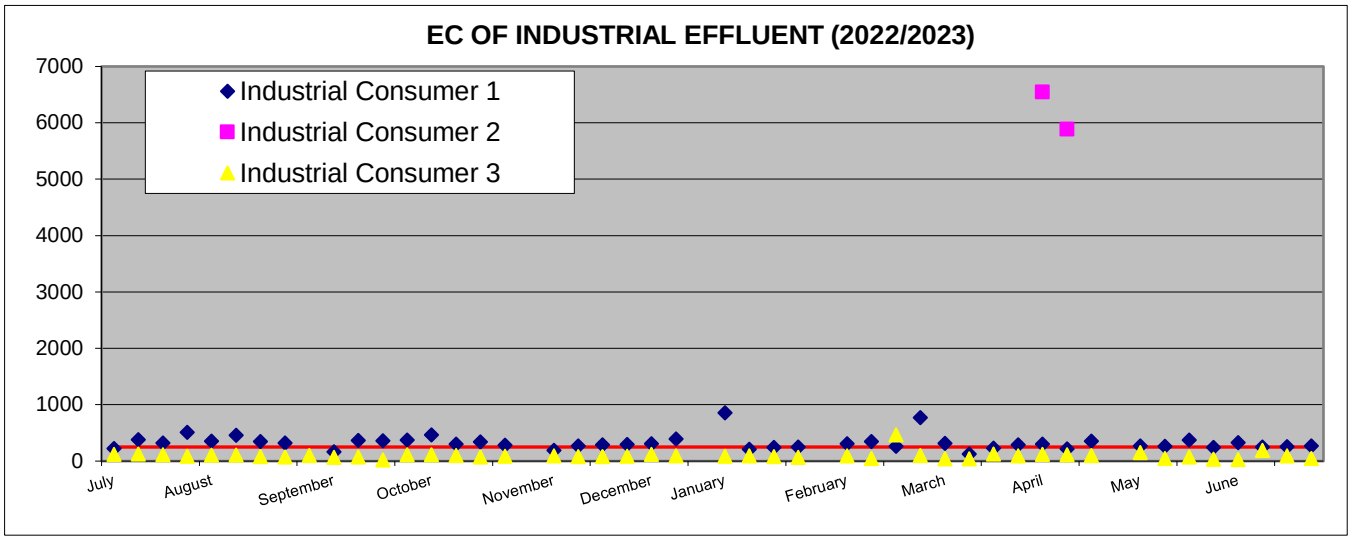
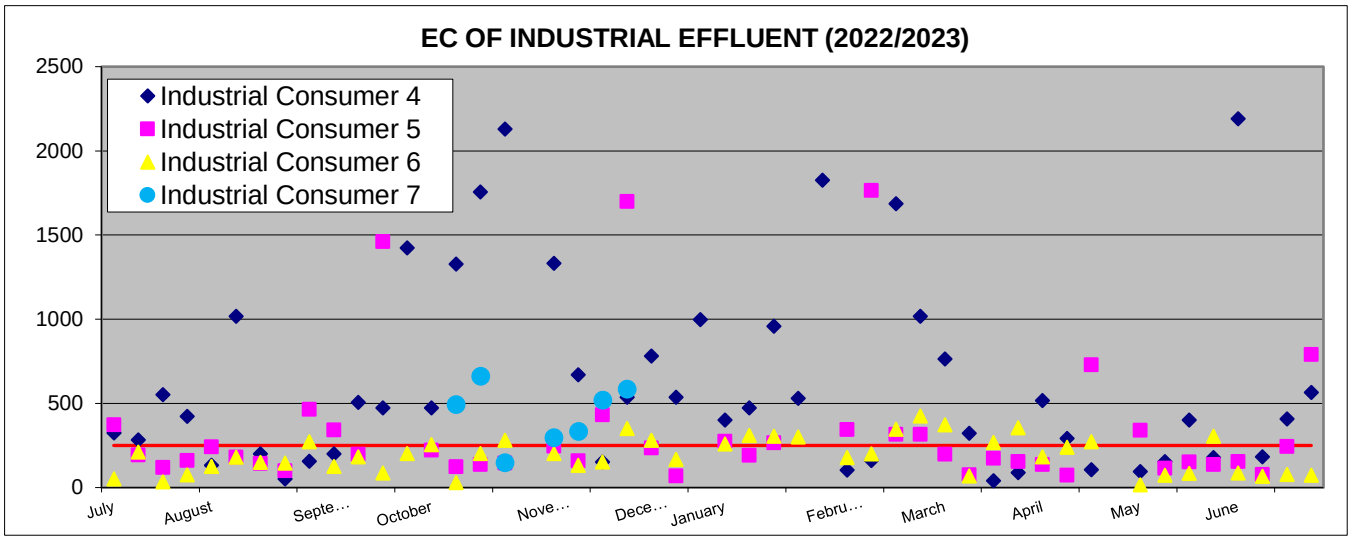
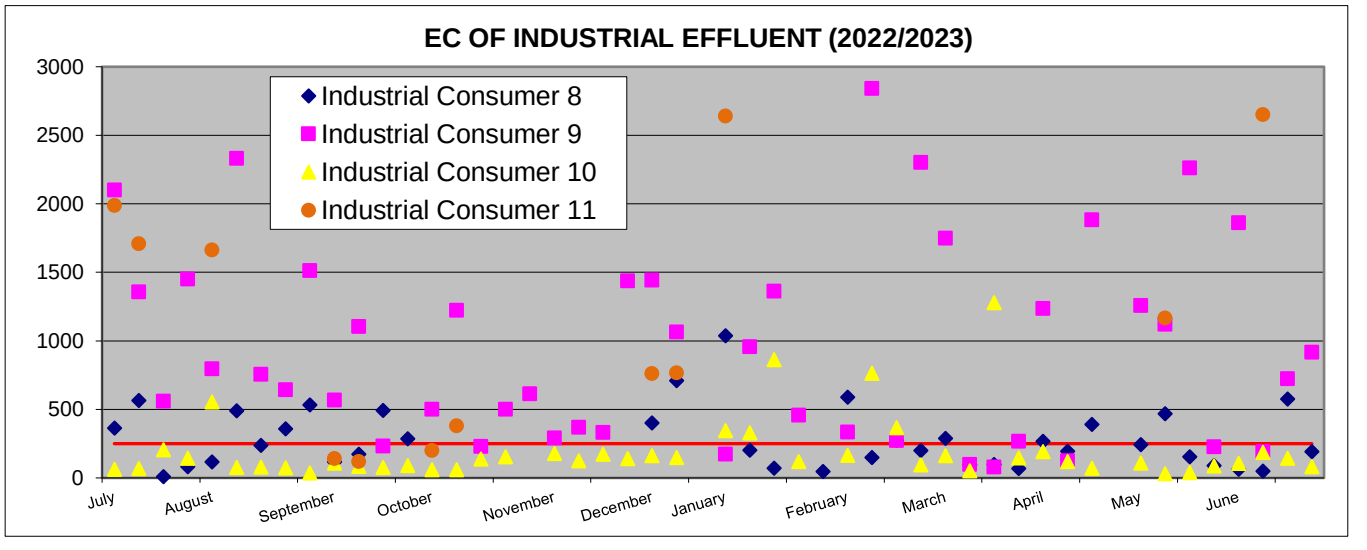
February
March
April
May
June


EC OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 1
Industrial Consumer 2
Industrial Consumer 3
7000
6000
5000
4000
3000
2000
1000
0
July
August
September
October
November
December
January
February
March
April
May
June


EC OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 4
Industrial Consumer 5
Industrial Consumer 6
Industrial Consumer 7
2500
2000
1500
1000
500
0
July
August
Septe…
October
Nove…
Dece…
January
Febru…
March
April
May
June


EC OF INDUSTRIAL EFFLUENT (2022/2023)
Industrial Consumer 8
Industrial Consumer 9
Industrial Consumer 10
Industrial Consumer 11
3000
2500
2000
1500
1000
500
0
July
August
September
October
November
December
January
February
March
April
May
June

George			SANS 241:2015	Compliance Calculations (Population size > 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	288	266	92.4%	**Unacceptable**	R	**No**	**9.95**
Conductivity	mS/m	Aesthetic	≤ 170	288	288	100.0%	Excellent	P/N	Yes	**20.32**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	288	288	100.0%	Excellent	N	Yes	**129.82**
Turbidity	NTU	Operational	≤ 1	289	282	97.6%	Excellent	P/R	Yes	**0.57**
		Aesthetic	≤ 5	289	288	99.7%	Excellent	P/N	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	288	288	100.0%	Excellent	P	Yes	**7.63**
Free Chlorine	mg/L	Chronic Health	≤ 5	287	287	100.0%	Excellent	P	Yes	**0.51**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	288	288	100.0%	Excellent	N	Yes	**47.77**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	288	288	100.0%	Excellent	N	Yes	**83.82**
		Aesthetic	≤ 300	288	279	96.9%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	288	288	100.0%	Excellent	N	Yes	**19.88**
		Aesthetic	≤ 100	288	287	99.7%	Excellent	N	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	288	287	99.7%	Excellent	N	Yes	**92.19**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	289	289	100.0%	Excellent	P	Yes	**0.00**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	289	281	97.2%	Excellent	N	Yes	**1.42**
Alkalinity (as $CaCO_3$)	mg/L		-	288						**31.82**
Calcium Hardness (as $CaCO_3$)	mg/L		-	288						**21.20**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	288						**21.74**
Total Hardness (as $CaCO_3$)	mg/L		-	288						**43.11**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	288	288	100.0%	Excellent		Yes	**8.58**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	288	288	100.0%	Excellent		Yes	**5.32**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0					
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0					
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0					
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0					
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0					
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0					
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0					
		Aesthetic	≤ 250	0	0					
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0					
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0					
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0					
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0					
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0					
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0					
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0					
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0					
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0					
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0					
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0					
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0					
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0					
Barium	µg/L	Chronic Health	≤ 700	0	0					
Boron	mg/L	Chronic Health	≤ 2.4	0	0					
Chloroform	ug/L	Chronic Health	≤ 300	0	0					
Bromoform	ug/L	Chronic Health	≤ 100	0	0					
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0					
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0					
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0					
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0					
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0					
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0					
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	289	289	100.0%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	1151	1151	100.0%	**Excellent**
Aesthetic	2593	2560	98.7%	**Excellent**
Operational Efficiency	1442	1426	98.9%	**Excellent**

Wilderness			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	121	111	91.7%	Good	R	Yes	**10.75**
Conductivity	mS/m	Aesthetic	≤ 170	120	120	100.0%	Excellent	P/N	Yes	**22.18**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	120	120	100.0%	Excellent	N	Yes	**142.59**
Turbidity	NTU	Operational	≤ 1	121	116	95.9%	Excellent	P/R	Yes	**0.59**
		Aesthetic	≤ 5	121	121	100.0%	Excellent	P/N	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	121	120	99.2%	Excellent	P	Yes	**8.12**
Free Chlorine	mg/L	Chronic Health	≤ 5	124	124	100.0%	Excellent	P	Yes	**0.37**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	120	120	100.0%	Excellent	R	Yes	**51.20**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	120	120	100.0%	Excellent	N	Yes	**60.45**
		Aesthetic	≤ 300	120	117	97.5%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	120	120	100.0%	Excellent	N	Yes	**19.79**
		Aesthetic	≤ 100	120	120	100.0%	Excellent	R	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	122	118	96.7%	Excellent	N	Yes	**115.40**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	127	118	92.9%	Excellent	P	Yes	**0.70**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	127	123	96.9%	Excellent	N	Yes	**2.50**
Alkalinity (as $CaCO_3$)	mg/L		-	120						**36.63**
Calcium Hardness (as $CaCO_3$)	mg/L		-	120						**19.13**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	120						**23.77**
Total Hardness (as $CaCO_3$)	mg/L		-	120						**42.25**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	120	120	100.0%	Excellent		Yes	**7.66**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	120	120	100.0%	Excellent		Yes	**5.78**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0					
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0					
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0					
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0					
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0					
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0					
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0					
		Aesthetic	≤ 250	0	0					
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0					
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0					
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0					
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0					
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0					
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0					
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0					
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0					
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0					
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0					
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0					
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0					
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0					
Barium	µg/L	Chronic Health	≤ 700	0	0					
Boron	mg/L	Chronic Health	≤ 2.4	0	0					
Chloroform	ug/L	Chronic Health	≤ 300	0	0					
Bromoform	ug/L	Chronic Health	≤ 100	0	0					
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0					
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0					
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0					
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0					
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0					
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0					
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	127	118	92.9%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	484	484	100.0%	**Excellent**
Aesthetic	1082	1069	98.8%	**Excellent**
Operational Efficiency	611	597	97.7%	**Excellent**

Uniondale			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	106	94	88.7%	**Unacceptable**	R	**No**	**10.37**
Conductivity	mS/m	Aesthetic	≤ 170	102	102	100.0%	Excellent	P/N	Yes	**24.70**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	102	102	100.0%	Excellent	N	Yes	**155.56**
Turbidity	NTU	Operational	≤ 1	108	88	81.5%	**Unacceptable**	P/R	**No**	**1.66**
		Aesthetic	≤ 5	108	106	98.1%	Excellent	P/N	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	102	102	100.0%	Excellent	P	Yes	**7.54**
Free Chlorine	mg/L	Chronic Health	≤ 5	104	98	94.2%	Good	P	Yes	**2.05**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	102	102	100.0%	Excellent	R	Yes	**58.92**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	102	102	100.0%	Excellent	N	Yes	**64.58**
		Aesthetic	≤ 300	102	102	100.0%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	102	102	100.0%	Excellent	N	Yes	**19.09**
		Aesthetic	≤ 100	102	100	98.0%	Excellent	R	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	104	100	96.2%	Excellent	N	Yes	**119.81**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	102	101	99.0%	Excellent	P	Yes	**0.02**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	102	101	99.0%	Excellent	N	Yes	**2.01**
Alkalinity (as $CaCO_3$)	mg/L		-	102						**43.47**
Calcium Hardness (as $CaCO_3$)	mg/L		-	102						**22.98**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	102						**32.73**
Total Hardness (as $CaCO_3$)	mg/L		-	102						**55.71**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	102	102	100.0%	Excellent		Yes	**9.20**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	102	102	100.0%	Excellent		Yes	**7.95**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0					
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0					
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0					
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0					
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0					
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0					
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0					
		Aesthetic	≤ 250	0	0					
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0					
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0					
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0					
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0					
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0					
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0					
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0					
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0					
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0					
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0					
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0					
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0					
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0					
Barium	µg/L	Chronic Health	≤ 700	0	0					
Boron	mg/L	Chronic Health	≤ 2.4	0	0					
Chloroform	ug/L	Chronic Health	≤ 300	0	0					
Bromoform	ug/L	Chronic Health	≤ 100	0	0					
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0					
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0					
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0					
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0					
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0					
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0					
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	102	101	99.0%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	410	404	98.5%	**Excellent**
Aesthetic	928	912	98.3%	**Excellent**
Operational Efficiency	518	493	95.2%	**Excellent**

Haarlem			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	55	38	69.1%	**Unacceptable**	R	**No**	**18.09**
Conductivity	mS/m	Aesthetic	≤ 170	51	51	100.0%	Excellent	P/N	Yes	**13.30**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	51	51	100.0%	Excellent	N	Yes	**80.66**
Turbidity	NTU	Operational	≤ 1	55	30	54.5%	**Unacceptable**	P/R	**No**	**1.56**
		Aesthetic	≤ 5	55	53	96.4%	Excellent	P/R	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	51	51	100.0%	Excellent	P	Yes	**6.94**
Free Chlorine	mg/L	Chronic Health	≤ 5	52	52	100.0%	Excellent	P	Yes	**0.16**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	51	51	100.0%	Excellent	R	Yes	**40.51**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	51	51	100.0%	Excellent	N	Yes	**103.73**
		Aesthetic	≤ 300	51	50	98.0%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	51	51	100.0%	Excellent	N	Yes	**49.78**
		Aesthetic	≤ 100	51	45	88.2%	**Unacceptable**	R	**No**	
Aluminium (as Al)	ug/L	Operational	≤ 300	51	48	94.1%	Excellent	N	Yes	**101.75**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	53	49	92.5%	**Unacceptable**	P	**No**	**0.89**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	53	50	94.3%	Excellent	N	Yes	**5.34**
Alkalinity (as $CaCO_3$)	mg/L		-	51						**18.82**
Calcium Hardness (as $CaCO_3$)	mg/L		-	51						**18.20**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	51						**23.10**
Total Hardness (as $CaCO_3$)	mg/L		-	51						**41.29**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	51	51	100.0%	Excellent		Yes	**7.29**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	51	51	100.0%	Excellent		Yes	**5.55**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0					
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0					
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0					
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0					
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0					
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0					
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0					
		Aesthetic	≤ 250	0	0					
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0					
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0					
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0					
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0					
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0					
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0					
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0					
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0					
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0					
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0					
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0					
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0					
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0					
Barium	µg/L	Chronic Health	≤ 700	0	0					
Boron	mg/L	Chronic Health	≤ 2.4	0	0					
Chloroform	ug/L	Chronic Health	≤ 300	0	0					
Bromoform	ug/L	Chronic Health	≤ 100	0	0					
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0					
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0					
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0					
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0					
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0					
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0					
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	53	49	92.5%	**Unacceptable**
Acute Health Chemical	0	0		
Chronic Health	205	205	100.0%	**Excellent**
Aesthetic	467	441	94.4%	**Excellent**
Operational Efficiency	261	230	88.1%	**Unacceptable**

George Old WTW Raw			SANS 241:2015	Compliance Calculations (Population size > 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	54	0	0.0%		R		**458.80**
Conductivity	mS/m	Aesthetic	≤ 170	54	54	100.0%		P/N		**11.59**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	54	54	100.0%		N		**73.99**
Turbidity	NTU	Operational	≤ 1	54	0	0.0%		P/R		**7.31**
		Aesthetic	≤ 5	54	14	25.9%		P/N		
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	54	47	87.0%		P		**5.99**
Free Chlorine	mg/L	Chronic Health	≤ 5	0	0			P		
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	54	54	100.0%		N		**35.78**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	54	41	75.9%		N		**1578.61**
		Aesthetic	≤ 300	54	1	1.9%		R		
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	54	25	46.3%		N		**522.48**
		Aesthetic	≤ 100	54	3	5.6%		N		
Aluminium (as Al)	ug/L	Operational	≤ 300	54	17	31.5%		N		**342.80**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	0	0			P		
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	0	0			N		
Alkalinity (as $CaCO_3$)	mg/L		-	54						**14.89**
Calcium Hardness (as $CaCO_3$)	mg/L		-	54						**16.07**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	54						**24.81**
Total Hardness (as $CaCO_3$)	mg/L		-	54						**40.89**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	54	54	100.0%				**6.44**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	54	54	100.0%				**6.03**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			N		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			N		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			R		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			R		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			R		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			R		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			R		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			R		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	0	0		
Acute Health Chemical	0	0		
Chronic Health	162	120	74.1%	
Aesthetic	486	288	59.3%	
Operational Efficiency	216	118	54.6%	

George Old WTW			SANS 241:2015	Compliance Calculations (Population size > 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	103	96	93.2%	Good	R	Yes	**9.05**
Conductivity	mS/m	Aesthetic	≤ 170	100	100	100.0%	Excellent	P/N	Yes	**17.37**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	100	100	100.0%	Excellent	N	Yes	**111.40**
Turbidity	NTU	Operational	≤ 1	102	97	95.1%	Excellent	P/R	Yes	**0.51**
		Aesthetic	≤ 5	102	102	100.0%	Excellent	P/N	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	100	100	100.0%	Excellent	P	Yes	**7.03**
Free Chlorine	mg/L	Chronic Health	≤ 5	100	99	99.0%	Excellent	P	Yes	**1.46**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	100	100	100.0%	Excellent	N	Yes	**49.02**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	100	100	100.0%	Excellent	N	Yes	**42.09**
		Aesthetic	≤ 300	100	100	100.0%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	100	100	100.0%	Excellent	N	Yes	**22.34**
		Aesthetic	≤ 100	100	99	99.0%	Excellent	N	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	100	100	100.0%	Excellent	N	Yes	**76.74**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	100	100	100.0%	Excellent	P	Yes	**0.00**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	100	99	99.0%	Excellent	N	Yes	**0.33**
Alkalinity (as $CaCO_3$)	mg/L		-	100						**27.60**
Calcium Hardness (as $CaCO_3$)	mg/L		-	100						**19.24**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	100						**26.74**
Total Hardness (as $CaCO_3$)	mg/L		-	100						**45.98**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	100	100	100.0%	Excellent		Yes	**7.70**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	100	100	100.0%	Excellent		Yes	**6.52**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			N		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			N		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			R		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			R		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			R		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			R		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			R		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			R		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	100	100	100.0%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	400	399	99.8%	**Excellent**
Aesthetic	905	897	99.1%	**Excellent**
Operational Efficiency	502	496	98.8%	**Excellent**

George New WTW Raw			SANS 241:2015	Compliance Calculations (Population size > 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	53	0	0.0%		R		**444.42**
Conductivity	mS/m	Aesthetic	≤ 170	53	53	100.0%		P/N		**12.03**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	53	53	100.0%		N		**80.85**
Turbidity	NTU	Operational	≤ 1	53	0	0.0%		P/R		**7.98**
		Aesthetic	≤ 5	53	11	20.8%		P/N		
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	53	47	88.7%		P		**6.21**
Free Chlorine	mg/L	Chronic Health	≤ 5	0	0			P		
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	53	53	100.0%		N		**36.60**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	53	38	71.7%		N		**1543.32**
		Aesthetic	≤ 300	53	1	1.9%		R		
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	53	23	43.4%		N		**607.38**
		Aesthetic	≤ 100	53	2	3.8%		N		
Aluminium (as Al)	ug/L	Operational	≤ 300	53	19	35.8%		N		**345.66**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	0	0			P		
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	0	0			N		
Alkalinity (as $CaCO_3$)	mg/L		-	53						**15.58**
Calcium Hardness (as $CaCO_3$)	mg/L		-	53						**16.08**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	53						**26.92**
Total Hardness (as $CaCO_3$)	mg/L		-	53						**43.00**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	53	53	100.0%				**6.44**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	53	53	100.0%				**6.53**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			N		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			N		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			R		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			R		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			R		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			R		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			R		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			R		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	0	0		
Acute Health Chemical	0	0		
Chronic Health	159	114	71.7%	
Aesthetic	477	279	58.5%	
Operational Efficiency	212	119	56.1%	

George New WTW			SANS 241:2015	Compliance Calculations (Population size > 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	104	97	93.3%	Good	R	Yes	**6.97**
Conductivity	mS/m	Aesthetic	≤ 170	102	102	100.0%	Excellent	P/N	Yes	**24.66**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	102	102	100.0%	Excellent	N	Yes	**140.30**
Turbidity	NTU	Operational	≤ 1	103	99	96.1%	Excellent	P/R	Yes	**0.46**
		Aesthetic	≤ 5	103	103	100.0%	Excellent	P/N	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	102	102	100.0%	Excellent	P	Yes	**7.49**
Free Chlorine	mg/L	Chronic Health	≤ 5	103	102	99.0%	Excellent	P	Yes	**2.52**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	102	102	100.0%	Excellent	N	Yes	**52.02**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	102	101	99.0%	Excellent	N	Yes	**84.81**
		Aesthetic	≤ 300	102	98	96.1%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	102	102	100.0%	Excellent	N	Yes	**24.87**
		Aesthetic	≤ 100	102	100	98.0%	Excellent	N	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	102	102	100.0%	Excellent	N	Yes	**91.69**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	103	102	99.0%	Excellent	P	Yes	**0.01**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	103	103	100.0%	Excellent	N	Yes	**0.15**
Alkalinity (as $CaCO_3$)	mg/L		-	102						**39.31**
Calcium Hardness (as $CaCO_3$)	mg/L		-	102						**21.37**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	102						**26.41**
Total Hardness (as $CaCO_3$)	mg/L		-	102						**47.78**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	102	102	100.0%	Excellent		Yes	**8.56**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	102	102	100.0%	Excellent		Yes	**6.42**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			N		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			N		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			R		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			R		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			R		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			R		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			R		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			R		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	103	102	99.0%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	409	407	99.5%	**Excellent**
Aesthetic	921	908	98.6%	**Excellent**
Operational Efficiency	512	508	99.2%	**Excellent**

Wilderness WTW Raw			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	14	0	0.0%		R		**102.79**
Conductivity	mS/m	Aesthetic	≤ 170	14	14	100.0%		P/N		**15.42**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	14	14	100.0%		N		**96.50**
Turbidity	NTU	Operational	≤ 1	14	4	28.6%		P/R		**1.98**
		Aesthetic	≤ 5	14	13	92.9%		P/R		
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	14	14	100.0%		P		**6.22**
Free Chlorine	mg/L	Chronic Health	≤ 5	0	0			P		
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	14	14	100.0%		R		**44.00**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	14	14	100.0%		N		**289.57**
		Aesthetic	≤ 300	14	9	64.3%		R		
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	14	13	92.9%		N		**112.93**
		Aesthetic	≤ 100	14	7	50.0%		R		
Aluminium (as Al)	ug/L	Operational	≤ 300	14	11	78.6%		N		**211.64**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	0	0			P		
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	0	0			N		
Alkalinity (as $CaCO_3$)	mg/L		-	14						**10.86**
Calcium Hardness (as $CaCO_3$)	mg/L		-	14						**13.71**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	14						**34.14**
Total Hardness (as $CaCO_3$)	mg/L		-	14						**47.86**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	14	14	100.0%				**5.49**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	14	14	100.0%				**8.30**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	0	0		
Acute Health Chemical	0	0		
Chronic Health	42	41	97.6%	
Aesthetic	126	99	78.6%	
Operational Efficiency	56	43	76.8%	

Wilderness WTW			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	56	42	75.0%	**Unacceptable**	R	**No**	**13.59**
Conductivity	mS/m	Aesthetic	≤ 170	52	52	100.0%	Excellent	P/N	Yes	**24.53**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	52	52	100.0%	Excellent	N	Yes	**154.12**
Turbidity	NTU	Operational	≤ 1	56	43	76.8%	**Unacceptable**	P/R	**No**	**0.77**
		Aesthetic	≤ 5	56	56	100.0%	Excellent	P/R	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	53	50	94.3%	Excellent	P	Yes	**8.56**
Free Chlorine	mg/L	Chronic Health	≤ 5	52	50	96.2%	Excellent	P	Yes	**2.03**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	52	52	100.0%	Excellent	R	Yes	**53.46**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	52	52	100.0%	Excellent	N	Yes	**58.38**
		Aesthetic	≤ 300	52	51	98.1%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	52	51	98.1%	Excellent	N	Yes	**30.25**
		Aesthetic	≤ 100	52	51	98.1%	Excellent	R	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	53	48	90.6%	Good	N	Yes	**182.19**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	52	51	98.1%	Excellent	P	Yes	**0.04**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	52	50	96.2%	Excellent	N	Yes	**4.21**
Alkalinity (as $CaCO_3$)	mg/L		-	52						**43.38**
Calcium Hardness (as $CaCO_3$)	mg/L		-	52						**18.46**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	52						**26.88**
Total Hardness (as $CaCO_3$)	mg/L		-	52						**45.35**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	52	52	100.0%	Excellent		Yes	**7.39**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	52	52	100.0%	Excellent		Yes	**6.63**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	52	51	98.1%	**Excellent**
Acute Health Chemical	0	0		
Chronic Health	208	205	98.6%	**Excellent**
Aesthetic	476	460	96.6%	**Excellent**
Operational Efficiency	266	243	91.4%	**Good**

Uniondale WTW Raw			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	50	5	10.0%		R		**164.84**
Conductivity	mS/m	Aesthetic	≤ 170	50	49	98.0%		P/N		**22.28**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	50	50	100.0%		N		**116.45**
Turbidity	NTU	Operational	≤ 1	50	1	2.0%		P/R		**34.15**
		Aesthetic	≤ 5	50	22	44.0%		P/R		
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	50	50	100.0%		P		**7.01**
Free Chlorine	mg/L	Chronic Health	≤ 5	0	0			P		
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	50	50	100.0%		R		**52.64**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	50	44	88.0%		N		**887.80**
		Aesthetic	≤ 300	50	18	36.0%		R		
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	50	47	94.0%		N		**132.64**
		Aesthetic	≤ 100	50	33	66.0%		R		
Aluminium (as Al)	ug/L	Operational	≤ 300	50	48	96.0%		N		**58.10**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	0	0			P		
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	0	0			N		
Alkalinity (as $CaCO_3$)	mg/L		-	50						**23.32**
Calcium Hardness (as $CaCO_3$)	mg/L		-	50						**20.96**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	50						**29.80**
Total Hardness (as $CaCO_3$)	mg/L		-	50						**50.76**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	50	50	100.0%				**8.39**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	50	50	100.0%				**7.24**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	0	0		
Acute Health Chemical	0	0		
Chronic Health	150	141	94.0%	
Aesthetic	450	327	72.7%	
Operational Efficiency	200	149	74.5%	

Uniondale WTW			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	52	49	94.2%	Excellent	R	Yes	**6.21**
Conductivity	mS/m	Aesthetic	≤ 170	52	52	100.0%	Excellent	P/N	Yes	**24.84**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	52	52	100.0%	Excellent	N	Yes	**155.20**
Turbidity	NTU	Operational	≤ 1	55	48	87.3%	**Unacceptable**	P/R	**No**	**0.64**
		Aesthetic	≤ 5	55	55	100.0%	Excellent	P/R	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	52	52	100.0%	Excellent	P	Yes	**7.59**
Free Chlorine	mg/L	Chronic Health	≤ 5	53	52	98.1%	Excellent	P	Yes	**1.58**
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	52	52	100.0%	Excellent	R	Yes	**60.35**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	52	52	100.0%	Excellent	N	Yes	**48.27**
		Aesthetic	≤ 300	52	52	100.0%	Excellent	R	Yes	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	52	52	100.0%	Excellent	N	Yes	**16.94**
		Aesthetic	≤ 100	52	52	100.0%	Excellent	R	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	53	51	96.2%	Excellent	N	Yes	**114.87**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	54	52	96.3%	Good	P	Yes	**18.89**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	54	52	96.3%	Excellent	N	Yes	**7.43**
Alkalinity (as $CaCO_3$)	mg/L		-	52						**44.62**
Calcium Hardness (as $CaCO_3$)	mg/L		-	52						**24.08**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	52						**31.81**
Total Hardness (as $CaCO_3$)	mg/L		-	52						**55.88**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	52	52	100.0%	Excellent		Yes	**9.64**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	52	52	100.0%	Excellent		Yes	**7.73**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	54	52	96.3%	**Good**
Acute Health Chemical	0	0		
Chronic Health	209	208	99.5%	**Excellent**
Aesthetic	471	468	99.4%	**Excellent**
Operational Efficiency	266	255	95.9%	**Excellent**

Haarlem WTW Raw			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	51	0	0.0%		R		**86.78**
Conductivity	mS/m	Aesthetic	≤ 170	51	51	100.0%		P/N		**5.37**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	51	51	100.0%		N		**34.48**
Turbidity	NTU	Operational	≤ 1	51	0	0.0%		P/R		**2.86**
		Aesthetic	≤ 5	51	47	92.2%		P/R		
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	51	49	96.1%		P		**6.12**
Free Chlorine	mg/L	Chronic Health	≤ 5	0	0			P		
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	51	51	100.0%		R		**22.47**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	51	49	96.1%		N		**696.43**
		Aesthetic	≤ 300	51	5	9.8%		R		
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	51	50	98.0%		N		**142.59**
		Aesthetic	≤ 100	51	19	37.3%		R		
Aluminium (as Al)	ug/L	Operational	≤ 300	51	30	58.8%		N		**272.94**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	0	0			P		
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	0	0			N		
Alkalinity (as $CaCO_3$)	mg/L		-	51						**13.73**
Calcium Hardness (as $CaCO_3$)	mg/L		-	51						**15.61**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	51						**24.35**
Total Hardness (as $CaCO_3$)	mg/L		-	51						**39.96**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	51	51	100.0%				**6.25**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	51	51	100.0%				**5.92**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	0	0		
Acute Health Chemical	0	0		
Chronic Health	153	150	98.0%	
Aesthetic	459	326	71.0%	
Operational Efficiency	204	130	63.7%	

Haarlem WTW			SANS 241:2015	Compliance Calculations (Population size < 100 000)						
Parameter	Unit	Risk	Standard Limits (SANS 241-2011 and SANS 241-2006 Class I)	Total Number of Samples	Number of Samples Complying	% Compliance Achieved	Performance (SANS 241-2:2015 Table 4)	**Risk Character** P = prescribed monitoring R = identified risk N = negligible risk	Compliance Status (Yes / No)	Average
Colour	mg/L	Aesthetic	≤ 15	54	36	66.7%	**Unacceptable**	R	**No**	**18.56**
Conductivity	mS/m	Aesthetic	≤ 170	52	52	100.0%	Excellent	P/N	Yes	**12.94**
Total Dissolved Solids	mg/L	Aesthetic	≤ 1 200	52	52	100.0%	Excellent	N	Yes	**81.74**
Turbidity	NTU	Operational	≤ 1	55	31	56.4%	**Unacceptable**	P/R	**No**	**1.73**
		Aesthetic	≤ 5	55	50	90.9%	Good	P/R	Yes	
pH (at 25°C)		Operational	≥5.0 - ≤ 9.7	52	52	100.0%	Excellent	P	Yes	**6.83**
Free Chlorine	mg/L	Chronic Health	≤ 5	55	50	90.9%	**Unacceptable**	P	**No**	
Chloride (as Cl)	mg/L	Aesthetic	≤ 300	52	52	100.0%	Excellent	R	Yes	**39.96**
Iron (as Fe)	ug/L	Chronic Health	≤ 2000	53	53	100.0%	Excellent	N	Yes	**174.32**
		Aesthetic	≤ 300	53	45	84.9%	**Unacceptable**	R	**No**	
Manganese (as Mn)	ug/L	Chronic Health	≤ 400	52	52	100.0%	Excellent	N	Yes	**42.46**
		Aesthetic	≤ 100	52	48	92.3%	Good	R	Yes	
Aluminium (as Al)	ug/L	Operational	≤ 300	52	48	92.3%	Good	N	Yes	**118.17**
E.Coli (<1 taken as 0)	cfu/100ml	Acute Health Micro	≤ 0	54	51	94.4%	**Unacceptable**	P	**No**	**3.93**
Total Coliform Count (<1 taken as 0)	cfu/100ml	Operational	≤ 10	54	52	96.3%	Excellent	N	Yes	**4.46**
Alkalinity (as $CaCO_3$)	mg/L		-	52						**18.27**
Calcium Hardness (as $CaCO_3$)	mg/L		-	52						**17.42**
Magnesium Hardness (as $CaCO_3$)	mg/L		-	52						**23.79**
Total Hardness (as $CaCO_3$)	mg/L		-	52						**41.04**
Calcium (as Ca)	mg/L	Aesthetic / Operation	**≤ 150**	52	52	100.0%	Excellent		Yes	**6.98**
Magnesium (as Mg)	mg/L	Aesthetic / Health	**≤ 70**	52	52	100.0%	Excellent		Yes	**5.73**
Fluoride (as F)	mg/L	Chronic Health	≤ 1.5	0	0			R		
Sodium (as Na)	mg/L	Aesthetic	≤ 200	0	0			N		
Potassium (as K)	mg/L	Operational / Health	**≤ 50**	0	0					
Zinc (as Zn)	mg/L	Aesthetic	≤ 5	0	0			N		
Ammonia Nitrogen (as N)	mg/L	Aesthetic	≤ 1.5	0	0			N		
Nitrate as N	mg/L	Acute Health Chemical	≤ 11	0	0			R		
Nitrite as N	mg/L	Acute Health Chemical	≤ 0.9	0	0			N		
Sulphate (as SO_4^{2-})	mg/L	Acute Health Chemical	≤ 500	0	0			N		
		Aesthetic	≤ 250	0	0			N		
Antimony (as Sb)	ug/L	Chronic Health	≤ 20	0	0			N		
Arsenic (as As)	ug/L	Chronic Health	≤ 10	0	0			N		
Cadmium (as Cd)	ug/L	Chronic Health	≤ 3	0	0			N		
Chromium (as Cr)	ug/L	Chronic Health	≤ 50	0	0			N		
Cobalt (as Co)	ug/L	Chronic Health	**≤ 500**	0	0					
Copper (as Cu)	ug/L	Chronic Health	≤ 2000	0	0			N		
Lead (as Pb)	ug/L	Chronic Health	≤ 10	0	0			N		
Mercury (as Hg)	ug/L	Chronic Health	≤ 6	0	0			N		
Nickel (as Ni)	ug/L	Chronic Health	≤ 70	0	0			N		
Selenium (as Se)	ug/L	Chronic Health	≤ 40	0	0			N		
Uranium (as U)	ug/L	Chronic Health	≤ 30	0	0			N		
Cyanide	ug/L	Acute Health Chemical	≤ 200	0	0			N		
Total Organic Carbon	mg/L	Chronic Health	≤ 10	0	0			N		
Monochloramine (mg/l)	mg/L	Chronic Health	≤ 3	0	0			N		
Barium	µg/L	Chronic Health	≤ 700	0	0			N		
Boron	mg/L	Chronic Health	≤ 2.4	0	0			N		
Chloroform	ug/L	Chronic Health	≤ 300	0	0			N		
Bromoform	ug/L	Chronic Health	≤ 100	0	0			N		
Dibromochloromethane	ug/L	Chronic Health	≤ 100	0	0			N		
Bromodichloromethane	ug/L	Chronic Health	≤ 60	0	0			N		
Combined Trihalomethanes	mg/L	Chronic Health	≤ 1	0	0			N		
Total Microcystins	µg/L	Chronic Health	≤ 1	0	0					
Phenols	ug/L	Aesthetic	≤ 10	0	0			N		
Heterotrophic Plate Count	cfu/ml	Operational	≤ 1000	0	0			P		
Somatic Coliphages	cfu/10ml	Operational	≤ 0	0	0			N		
Giardia Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					
Cryptosporidium Species	cfu/10 l	Acute Health Micro	≤ 0	0	0					

Acute Health Microbiological	54	51	94.4%	**Unacceptable**
Acute Health Chemical	0	0		
Chronic Health	212	207	97.6%	**Excellent**
Aesthetic	474	439	92.6%	**Good**
Operational Efficiency	265	235	88.7%	**Unacceptable**

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

DIRECTORATE
CIVIL ENGINEERING SERVICES

DIRECTOR: CIVIL ENGINEERING SERVICES
SECTION 56
WC044CVCV0001
VACANT

SECTION
EXECUTIVE SUPPORT

EXECUTIVE SUPPORT OFFICER
WC044CVCV1263
T BARNARD

BRANCH
WATER SERVICES

DEPUTY DIRECTOR: WATER & WASTE WATER SERVICES
WC044CVWW1908
D DE JAGER

BRANCH
TRANSPORT

DEPUTY DIRECTOR: TRANSPORT
WC044CVPT2362
VACANT

BRANCH
WASTE WATER SERVICES

DEPUTY DIRECTOR: WASTE WATER SERVICES
WC044CVWW1903
VACANT

BRANCH
ROADS & STORM WATER SERVICES

DEPUTY DIRECTOR: STREETS & STORM WATER SERVICES
WC044CVRS1907
R L DANIELS

BRANCH
SUPPORT SERVICES

SENIOR MANAGER: SUPPORT SERVICES
WC044CVSS2274
VACANT

BRANCH
INFRASTRUCTURE PLANNING AND PROJECT MANAGEMENT

DEPUTY DIRECTOR: PLANNING SECTION
WC044CVPM1264
L MOOIMAN

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

BRANCH
WATER SERVICES

DEPUTY DIRECTOR: WATER & WASTE WATER SERVICES
WC044CVWW1908
D DE JAGER

SECTION
WATER TREATMENT

SENIOR MANAGER: WATER TREATMENT
WC044CVWT1265
GH BREDENKAMP

SECTION
WATER DISTRIBUTION

MANAGER: WATER DISTRIBUTION
WC044CVDS1326
MS CHONCO

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SECTION
WATER TREATMENT

SENIOR MANAGER: WATER TREATMENT
WC044CVWT1265
GH BREDENKAMP

CLERK: WATER TREATMENT x2
WC044CVWT1286 LM CUPIDO
WC044CVWT1287 LN NDZIPHO

SUB - SECTION
NEW WATER TREATMENT WORKS &
UNIONDALE / HAARLEM

SUPERINTENDENT: WATER PURIFICATION
WC044CVWT8835
M KOOPMAN

SUB - SECTION
OLD WATER TREATMENT WORKS &
WILDERNESS WATER TREATMENT WORKS

SUPERINTENDENT: WATER PURIFICATION
WC044CVWT2257
G GOLIATH

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
NEW WATER TREATMENT WORKS &
UNIONDALE / HAARLEM

SUPERINTENDENT: WATER PURIFICATION
WC044CVWT8835
M KOOPMAN

HAARLEM
WATER TREATMENT WORKS

SUPERVISOR
WC044CESWWS4920
WL MEIRING

SUPERVISOR
WC044CESWWS4921
AL BROOKS

PROCESS CONTROLLER
WC044CESWWS4923
VACANT

UNIONDALE
WATER TREATMENT WORKS

SUPERVISOR
WC044CESWWS4924
H JANSEN

SUPERVISOR
WC044CESWWS4925
L STANDER

SUPERVISOR
WC044CESWWS4922
H KOBUS

PROCESS CONTROLLER
WC044CESWWS4937
VACANT

NEW TREATMENT
WORKS

CLEANING &
MAINTENANCE

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
NEW WATER TREATMENT WORKS &
UNIONDALE / HAARLEM

SUPERINTENDENT: WATER PURIFICATION
WC044CVWT8835
M KOOPMAN

HAARLEM
WATER TREATMENT WORKS

UNIONDALE
WATER TREATMENT WORKS

NEW TREATMENT WORKS

FOREMAN: WATER PURIFICATION x4
WC044CVWT1271 H BOTHA
WC044CVWT1272 LL STRYDOM
WC044CVWT1912 SL HANNIE

WC044CVWT4926 VACANT

SUPERVISOR: WATER PURIFICATION x4
WC044CVWT1274 S MGQOBHOZI
WC044CVWT1764 RW VISAGIE
WC044CVWT4927 L ZAKHE

WC044CVWT5422 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWT1277 J WINDWAAI
WC044CVWT1278 S PAPISO
WC044CVWT1281 C BOTHA

WC044CVWT5423 VACANT

CLEANING & MAINTENANCE

SUPERVISOR DRIVER
WC044CVWT0748
VACANT

OFFICE ATTENDANT
WC044CVWT1283
D ARRIES

WATER TREATMENT PLANT ASSISTANT x5
WC044CVWT1788 CM GOOSEN
WC044CVWT1789 HM LOURENS
WC044CVWT1918 A JANTJIES

WC044CVWT1284 VACANT
WC044CVWT5472 VACANT

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
OLD WATER TREATMENT WORKS & WILDERNESS WATER TREATMENT WORKS

SUPERINTENDENT: WATER PURIFICATION
WC044CVWT2257
G GOLIATH

OLD WATER TREATMENT WORKS

FOREMAN (WATER PURIFICATION) x4
WC044CVWT1273 SR LAIDO
WC044CVWT1913 JCG MATHABATHA
WC044CVWT1914 FP XHEGWANA
WC044CVWT2266 M LINGANI

SUPERVISOR (WATER PURIFICATION) x4
WC044CVWT1915 S LEEUW

WC044CVWT4919 VACANT

WC044CVWT1765 VACANT
WC044CVWT5420 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWT1279 BM MKANDU

WC044CVWT1280 VACANT

WC044CVWT1775 VACANT
WC044CVWT5421 VACANT

CLEANING & MAINTENANCE

SUPERVISOR DRIVER
WC044CVWT0693
VACANT

WATER TREATMENT PLANT ASSISTANT X4
WC044CVWT1785 MP MIAS
WC044CVWT1786 D PRINS
WC044CVWT1787 M JACOBS
WC044CVWT5476 E ABRAHAMS

WILDERNESS WATER TREATMENT WORKS

SUPERVISOR (WATER PURIFICATION) X4
WC044CVWT1275 N TEMBU
WC044CVWT1276 CL MEAS
WC044CVWT1916 GA BELELIE
WC044CVWT1917 M APPELS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SECTION
WATER DISTRIBUTION

MANAGER: WATER DISTRIBUTION
WC044CVDS1326
MS CHONCO

SENIOR ADMINISTRATION OFFICER: REVENUE MANAGEMENT
WC044CVDS1979
SC MICHAELS

GENERAL ASSISTANT
WC044CVDS1973
VACANT

SENIOR CLERK: DATA CAPTURING x2
WC044CVDS2263 N STUURMAN

WC044CVDS2287 VACANT

SUB - SECTION
MAINTENANCE, TANKER SERVICES, PLANT AND STOCK CONTROL & CONSTRUCTION

SUPERINTENDENT: MAINTENANCE AND CONSTRUCTION
WC044CVDS1332
JW SCHEEPERS

PIPELINE MAINTENANCE

TANKER SERVICES, PLANT & STOCK CONTROL

CONSTRUCTION

SUB - SECTION
METERING & WILDERNESS

SUPERINTENDENT: ROADS AND STORMWATER
WC044CVDS1330
MK GELDERBLOEM

METER MANAGEMENT

WILDERNESS

SUB - SECTION
INGIDENT REPAIRS

ASSISTANT SUPERINTENDENT: INDIGENT REPAIRS
WC044CVDS2368
VACANT

ADMINISTRATIVE OFFICER
WC044CVDS2103
CA NOMDOE

ASSISTANT PLUMBER x8
WC044CVDS2524 M KHAYI
WC044CVDS2525 C QHAYI
WC044CVDS2526 S MALOYI
WC044CVDS2527 K NTYINKALA
WC044VCDS2528 N NOGWAZA
WC044CVDS2529 G MAY

WC044CVDS2530 VACANT
WC044CVDS2531 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB - SECTION
MAINTENANCE, TANKER SERVICES, PLANT AND STOCK CONTROL & CONSTRUCTION

SUPERINTENDENT: MAINTENANCE AND CONSTRUCTION
WC044CVDS1332
JW SCHEEPERS

PIPELINE MAINTENANCE

TANKER SERVICES, PLANT & STOCK CONTROL

CONSTRUCTION

ASSISTANT SUPERINTENDENT
WC044CVDS1334
L MAQUTYWA

ARTISAN (PLUMBER)
WC044CVDS1337
B NDZIPHO

HANDYMAN (PLUMBER)
WC044CVDS2049
SC KOWA

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1348 AW HERWELS
WC044CVDS1353 SB ABRAHAMS
WC044CVDS1370 SE JANTJIES
WC044CVDS1375 EG OLIVIER

ARTISAN (PLUMBER) x2
WC044CVDS1343 VACANT
WC044CVDS1355 VACANT

HANDYMAN (PLUMBER)
WC044CVDS1356
VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1354 VACANT

WC044CVDS 1560 VACANT
WC044CVDS 2020 VACANT
WC044CVDS 2021 VACANT

ARTISAN (PLUMBER)
WC044CVDS1390
TW YALOLO

HANDYMAN (PLUMBER)
WC044CVDS1362
NJ JAXA

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1347 D JANSEN
WC044CVDS1387 B PIENAAR
WC044CVDS1393 J LOLWANA
WC044CVDS1587 E BANGO

ARTISAN (PLUMBER)
WC044CVDS1349
G PIETERSE

HANDYMAN (PLUMBER)
WC044CVDS1350
C SCHEEPERS

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1340 C KERSPUY
WC044CVDS1341 L SCOTT
WC044CVDS1374 SE MILO

WC044CVDS1342 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB - SECTION
MAINTENANCE, TANKER SERVICES, PLANT AND STOCK CONTROL & CONSTRUCTION

SUPERINTENDENT: MAINTENANCE AND CONSTRUCTION
WC044CVDS1332
JW SCHEEPERS

PIPELINE MAINTENANCE

TANKER SERVICES, PLANT & STOCK CONTROL

CONSTRUCTION

ASSISTANT SUPERINTENDENT
WC044CVDS5391
VACANT

DRIVER OPERATOR x3
WC044CVDS1377 SL MJONGILE
WC044CVDS1378 G KUPISO

WC044CVDS0536 VACANT

SUPERVISOR DRIVER x2
WC044CVDS1444 VACANT

WC044CVDS1904 VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1357 VACANT
WC044CVDS1358 VACANT
WC044CVDS1997 VACANT
WC044CVDS2013 VACANT

SUPERVISOR DRIVER x2
WC044CVDS1476 VACANT

WC044CVDS2241 VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1359 VACANT
WC044CVDS1569 VACANT
WC044CVDS2014 VACANT
WC044CVDS2022 VACANT

SUPERVISOR DRIVER x2
WC044CVDS2242 FS TEBELE

WC044CVDS2261 VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1345 MS MSEBENZI

WC044CVDS1366 VACANT

WC044CVDS1799 VACANT
WC044CVDS1846 VACANT

SUPERVISOR DRIVER x2
WC044CVDS2281 VACANT
WC044CVDS2284 VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1360 VACANT
WC044CVDS1399 VACANT
WC044CVDS2023 VACANT
WC044CVDS5397 VACANT

STOREMAN: ASSISTANT ARTISAN
WC044CVDS1333
M PLAATJIES

WATER DISTRIBUTION ASSISTANT
WC044CVDS5398
VACANT

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB - SECTION
MAINTENANCE, TANKER SERVICES, PLANT AND STOCK CONTROL & CONSTRUCTION

SUPERINTENDENT: MAINTENANCE AND CONSTRUCTION
WC044CVDS1332
JW SCHEEPERS

PIPELINE MAINTENANCE

TANKER SERVICES, PLANT & STOCK CONTROL

CONSTRUCTION

ASSISTANT SUPERINTENDENT
WC044CVDS1336
JP LANE

ARTISAN (PLUMBER)
WC044CVDS5394
VACANT

HANDYMAN (PLUMBER)
WC044CVDS1338
VACANT

SMALL PLANT OPERATOR
WC044CVDS1381
M BAKANOTHI

WATER DISTRIBUTION ASISTANT x6
WC044CVDS1385 VACANT
WC044CVDS1388 VACANT
WC044CVDS1395 VACANT
WC044CVDS1396 VACANT
WC044CVDS5399 VACANT
WC044CVDS5400 VACANT

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: Daniels DATE: 28/09/2022

APPROVED MUN MNGR: M.K.Y DATE: 29/09/2022

SUB-SECTION
METERING & WILDERNESS MAINTENANCE

SUPERINTENDENT: ROADS AND STORM WATER
WC044CVDS1330
MK GELDERBLOEM

METER MANAGEMENT

WILDERNESS

ASSISTANT SUPERINTENDENT
WC044CVDS1335
VACANT

ARTISAN (PLUMBER)
WC044CVDS5403
HW HARTZENBERG

HANDYMAN (PLUMBER)
WC044CVDS1464
J LAWERLOT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1346 EM JANSEN
WC044CVDS1351 N OLYN
WC044CVDS1386 LS MEYER

WC044CVDS1364 VACANT

ARTISAN (PLUMBER)
WC044CVDS1373
VM DINGISWAYO

HANDYMAN (PLUMBER)
WC044CVDS2047
S MASETI

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1383 J MTHEZA
WC044CVDS1384 WJ GONGQO

WC044CVDS1363 VACANT

WC044CVDS1999 VACANT

ARTISAN (PLUMBER)
WC044CVDS1369
DC LE JANDER

HANDYMAN (PLUMBER)
WC044CVS1391
ML KHETYE

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1372 MM WINDVOGEL
WC044CVDS1394 DF KRUGER

WC044CVDS1996 VACANT
WC044CVDS1998 VACANT

ARTISAN (PLUMBER)
WC044CVDS1365
AA LOUW

HANDYMAN (PLUMBER)
WC044CVDS1380
R JANSEN

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1352 E JACKSON
WC044CVDS1368 D MATROOS
WC044CVDS1371 JP PARKS
WC044CVDS1389 JA FRY

ARTISAN (PLUMBER)
WC044CVS1379
TR NYALELA

HANDYMAN (PLUMBER)
WC044CVDS1344
P SEPTEMBER

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1376 A MATIWANE
WC044CVDS1596 B VETO

WC044CVDS1400 VACANT
WC044CVDS2017 VACANT

ARTISAN (PUMBER)
WC044CVDS5404
VACANT

HANDYMAN (PLUMBER)
WC044CVS2289
VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS2015 VACANT
WC044CVDS2016 VACANT
WC044CVDS2018 VACANT
WC044CVDS2019 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
METERING & WILDERNESS MAINTENANCE

SUPERINTENDENT: ROADS AND STORM WATER
WC044CVDS1330
MK GELDERBLOEM

UNIONDALE / HAARLEM WATER DISTRIBUTION NETWORKS

METER MANAGEMENT

WILDERNESS

ASSISTANT SUPERINTENDENT
WC044CESWWS4887
VACANT

HANDYMAN x2
WC044CESWWS4889 VACANT
WC044CESWWS5479 VACANT

SMALL PLANT OPERATOR x3
WC044CESWWS2248 R WOLHUTER
WC044CESWWS4893 D BERENDS
WC044CESWWS4904 R VAN AARDT

SMALL PLANT OPERATOR
WC044CESWWS4899
SE PAULSE

ASSISTANT SUPERINTENDENT
WC044CVDS1581
H CYSTER

ARTISAN (PLUMBER)
WC044CVDS1361
T ABRAHAMS

ARTISAN (PLUMBER)
WC044CVDS5405
VACANT

HANDYMAN (PLUMBER)
WC044CVDS2050
VACANT

HANDYMAN (PLUMBER)
WC044CVDS5411
VACANT

WATER DISTRIBUTION ASSISTANT x4
WC044CVDS1382 K NTLAVA
WC044CVDS1585 R OCTOBER
WC044CVDS1588 E MINTOOR
WC044CVDS1598 JDD BUYS

WATER DISTRIBUTION ASISTANT x4
WC044CVDS1367 VACANT
WC044CVDS1586 VACANT
WC044CVDS1589 VACANT
WC044CVDS1597 VACANT

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED
DIRECTOR:_____ DATE:_____

APPROVED
MUN MNGR:_____ DATE: _____

BRANCH
TRANSPORT

DEPUTY DIRECTOR: TRANSPORT
WC044CVPT2362
VACANT

SECTION
PUBLIC TRANSPORT

PUBLIC TRANSPORT OVERSIGHT OFFICER
VACANT
WC044CVPT2333

SECRETARY
VR NDZONDA
WC044CVPT2358

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

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CONFIRMED DIRECTOR: Daniels DATE: 28/09/2022

APPROVED MUN MNGR: M.R.M DATE: 29/09/2022

BRANCH
WASTE WATER SERVICES

DEPUTY DIRECTOR: WASTE WATER SERVICES
WC044CVWW1903
VACANT

SECTION
WASTE WATER TREATMENT

SENIOR MANAGER: WASTE WATER TREATMENT
WC044CVWS1266
JJ SCHEEPERS

SECTION
SCIENTIFIC SERVICES

MANAGER: LABORATORY SERVICES
WC044CVLS1268
R WESSO

SECTION
WASTE WATER COLLECTION & CONVEYANCE

MANAGER: SEWER NETWORK
WC044CVWC1327
VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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CONFIRMED DIRECTOR: Daniels DATE: 28/09/2022

APPROVED MUN MNGR: M. K. DATE: 29/09/2022

SECTION
SCIENTIFIC SERVICES

MANAGER: LABORATORY SERVICES
WC044CVLS1268
R WESSO

SAMPLING

SUPERVISOR / DRIVER
WC044CVLS2260
VACANT

WATER PURIFICATION ASSISTANT
WC044CVLS1304
JJ DU PREEZ

SAMPLER x3
WC044CVLS1270 A LAWS
WC044CVLS1769 L ISAACS

WC044CVLS2054 VACANT

POTABLE WATER, WASTE WATER (WASTE&INDUSTRIAL) & MICROBIOLOGY

LABORATORY TECHNICIAN
WC044CVLS1901
P DANSTER

JUNIOR LABORATORY ASSISTANT
WC044CVLS2244
C PINDANI

LABORATORY TECHNICIAN
WC044CVLS1768
VACANT

JUNIOR LABORATORY ASSISTANT
WC044CVLS2055
VACANT

LABORATORY TECHNICIAN
WC044CVLS1269
E BAGIRATHI

JUNIOR LABORATORY ASSISTANT
WC044CVLS2243
R JULIES

ADMINISTRATION

CLERK
WC044CVLS2271
VACANT

GENERAL ASSISTANT
WC044CVLS2288
VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SECTION
WASTE WATER COLLECTION & CONVEYANCE

MANAGER: SEWER NETWORKS
WC044CVWC1327
VACANT

ADMINISTRATIVE ASSISTANT
WC044CVWC5464
VACANT

SENIOR CLERK (DATA CAPTURING)
WC044CVWC2041
AY DAVIDS

SUB - SECTION
NETWORK OPERATIONS & CONSTRUCTION

SUPERINTENDENT: SEWERAGE
WC044CVWC1401
E D CLEOPHAS

SUB - SECTION
PUMP STATIONS

SENIOR SUPERINTENDENT
WC044CVWC2862
M VAN HEERDEN

SUB - SECTION
MECHANICAL ENGINEERING SERVICES

SENIOR SUPERINTENDENT
WC044CVWC1763
C MAGGOTT

SUB - SECTION
PUMP STATION OPERATIONS & TANKER SERVICES

SUPERINTENDENT: SEWERAGE
WC044CVWC2040
S NINELA

SUB - SECTION
WASTE WATER SYSTEM COMPLIANCE

SUPERINTENDENT: SEWERAGE
WC044CVWC1422
EH JOUBERT

FOREMAN
WC044CVWC1784
VACANT

MAIN LINE INSPECTIONS

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC1427
XG MQOBONGO

STORMWATER INGRESS INSPECTIONS

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC5406
VACANT

GENERAL ASSISTANT
WC044CVWC2056
VACANT

INDUSTRIAL DISCHARGE COMPLIANCE

SENIOR SUPERVISOR
WC044CVWC2283
VACANT

GENERAL ASSISTANT
WC044CVWC5453
VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

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SUB-SECTION
NETWORK OPERATIONS & CONSTRUCTION

SUPERINTENDENT: SEWERAGE
WC044CVWC1401
E D CLEOPHAS

BLOCKAGES

ASSISTANT SUPERINTENDENT: SEWERAGE
WC044CVWC1423
R WILLIAMS

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC2059
ML MXWALI

SMALL PLANT OPERATOR X3
WC044CVWC1430 TK NTENGIO
WC044CVWC1441 ID GELDERBLOEM
WC044CVWC5386 C D ROELFSE

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC2025
P LINKS

SMALL PLANT OPERATOR x4
WC044CVWC1419 MJ BOOYSEN
WC044CVWC1431 GJ DAMONS
WC044CVWC5388 JJB BLAAUW
WC044CVWC5390 A NDWENKUKU

DEPOT

STOREMAN
WC044CVWC1439
T VOLONTIYA

SENIOR SUPERVISOR / DRIVER
WC044CVWC1425
D BIEL

SMALL PLANT OPERATOR x4
WC044CVWC1437 A NOKWAYI
WC044CVWC1449 CL CAROLUS

WC044CVWC1440 VACANT
WC044CVWC1451 VACANT

CONSTRUCTION

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC2058
MB MATEZA

SMALL PLANT OPERATOR X3
WC044CVWC1429 J MBILASE
WC044CVWC1438 AN ABRAHAMS
WC044CVWC5389 TA NDWENKUKU

SENIOR SUPERVISOR: SPRAY MACHINE
WC044CVWC1435
JC ABRAHAMS

SMALL PLANT OPERATOR X3
WC044CVWC1447 B BOLITYE
WC044CVWC1460 A HENDRICKS
WC044CVWC5387 RA HERMANS

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

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SUB-SECTION
NETWORK OPERATIONS & CONSTRUCTION

SUPERINTENDENT: SEWERAGE
WC044CVWC1401
E D CLEOPHAS

- BLOCKAGES
- DEPOT
- CONSTRUCTION
  - ASSISTANT SUPERINTENDENT
    WC044CVWC5380
    VACANT
    - DRIVER OPERATOR
      WC044CVWC5385
      VACANT
    - SENIOR SUPERVISOR / DRIVER
      WC044CVWC1426
      P SAAIMAN
      - HANDYMAN (PLUMBER)
        WC044CVWC5384
        A JAFTA
        - SMALL PLANT OPERATOR X2
          WC044CVWC1432 CB HENDRICKS
          WC044CVWC1436 SJD JAGERS
    - SENIOR SUPERVISOR: SEWERAGE
      WC044CVWC2029
      AS FANI
      - HANDYMAN (PLUMBER)
        WC044CVWC5382
        TS ADAM
        - SMALL PLANT OPERATOR
          WC044CVWC1434 S NKOLOLO
    - SUPERVISOR / DRIVER
      WC044CVWC5442
      VACANT
      - HANDYMAN (PLUMBER)
        WC044CVWC5381
        GC FERNOLD

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SECTION
PUMP STATIONS (ELECTRICAL)

SENIOR SUPERINTENDENT
M VAN HEERDEN
WC044CVWC2862

OPERATIONS

SPECIALISED ELECTRICIAN
C YOUNG
WC044CVWC2821

SPECIAL WORKMAN
NC NJOMBONI
WC044CVWC0427

ELECTRICAL ASSISTANT X2
WC044CVWC0419 AA JACKSON

WC044CVWC2787 VACANT

SPECIALISED ELECTRICIAN
IJ MEIRING
WC044CVWC2806

SPECIAL WORKMAN
VACANT
WC044CVWC0444

ELECTRICAL ASSISTANT
WC044CVWC0512 PA MURRAY

MAINTENANCE

SUPERINTENDENT
VACANT
WC044CVWC1607

SPECIAL WORKMAN
N P SOMDYALA
WC044CVWC0422

PUMP STATION MAINTENANCE

SPECIALISED ELECTRICIAN
F B SALMONS
WC044CVWC2834

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
MECHANICAL (ELECTRICAL)

SENIOR SUPERINTENDENT
C MAGGOTT
WC044CVWC1763

SUPERINTENDENT: ENGINEERING WORKSHOP
MW LANGBOOI
WC044CVWC1606

ARTISAN (WELDER)
VACANT
WC044CVWC2895

MECHANICAL ASSISTANT x2
WC044CVWC1610 HF MULLER

WC044CVWC1608 VACANT

ARTISAN (FITTER & TURNER)
WC044CVWC2894
P MARX

SPECIAL WORKMAN
WC044CVWC0963
VACANT

MECHANICAL ASSISTANT x2
WC044CVWC0435 AG CONA
WC044CVWC1611 I KITTAS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
PUMP STATION OPERATIONS AND TANKER SERVICE

SUPERINTENDENT: SEWERAGE
WC044CVWC2040
S NINELA

PUMP STATION OPERATION

FOREMAN: SEWERAGE
WC044CVWC1424
VACANT

HANDYMAN: PLUMBER
WC044CVWC1463
VACANT

SUPERVISOR DRIVER X2
(Wilderness)
WC044CVWC2046 VACANT
WC044CVWC5409 VACANT

SMALL PLANT OPERATOR x5
WC044CVWC1457 J KAMFER

(Wilderness)
WC044CVWC1409 VACANT
WC044CVWC1410 VACANT
WC044CVWC1411 VACANT
WC044CVWC1412 VACANT

PUMP STATION ASSISTANT
WC044CVWC1402
JC ABRAHAMS

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC5416
G HENDRICKS

SMALL PLANT OPERATOR x2
WC044CVWC1452 G MINTOOR

WC044CVWC5457 VACANT

SENIOR SUPERVISOR / DRIVER
WC044CVWC1450
MP MABENA

SUPERVISOR (PROCESS CONTROLLER) x2
WC044CVWC1404 M BOLITYE
WC044CVWC1406 MA MTAMO

TANKER SERVICE

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC2259
SB JACOBS

SUPERVISOR (PROCESS CONTROLLER) x3
WC044CVWC1403 F BAILEY
WC044CVWC1405 LM NOKWAYI
WC044CVWC1407 J BOOYSEN

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

SUB-SECTION
PUMP STATION OPERATIONS AND TANKER SERVICE

SUPERINTENDENT: SEWERAGE
WC044CVWC2040
S NINELA

PUMP STATION OPERATION

FOREMAN: SEWERAGE
WC044CVWC1424
VACANT

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC5418
CC NGAPHI

SMALL PLANT OPERATOR
WC044CVWC1433
V PETROS

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC1418
JJ MULLER

TANKER SERVICE

FOREMAN
WC044CVWC2061
VACANT

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC1420
H POTTS

SMALL PLANT OPERATOR x2
WC044CVWC1458 S FAYE
WC044CVWC5459 C BOB

SENIOR SUPERVISOR: SEWERAGE
WC044CVWC1416
JS TARENTAAL

SMALL PLANT OPERATOR x2
WC044CVWC1453 LL MPISANI

WC044CVWC1421 VACANT

NETWORK Uniondale / Haarlem

SUPERVISOR DRIVER
WC044CVWC4886
IS MATTHYS

SUPERVISOR/ DRIVER
WC044CVWC4943
VACANT

GENERAL ASSISTANT x2
WC044CVWC4898 D DE BRUYN
WC044CVWC4909 PCW ESAU

LEGEND

- FILLED POST
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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

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SECTION
WASTE WATER TREATMENT

SENIOR MANAGER: WASTE WATER TREATMENT
WC044CVWS1266
JJ SCHEEPERS

SUB - SECTION
WASTE WATER TREATMENT WORKS NORTH

SUPERINTENDENT: WATER POLLUTION CONTROL
WC044CVWS1767
AJ SCHEEPERS

SUB - SECTION
WASTE WATER TREATMENT WORKS SOUTH

SUPERINTENDENT: WATER POLLUTION CONTROL
WC044CVWS1766
D SAULS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

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SUB-SECTION
WASTE WATER TREATMENT WORKS NORTH

SUPERINTENDENT: WATER POLLUTION CONTROL
WC044CVWS1767
AJ SCHEEPERS

CLERK: WASTE WATER TREATMENT
WC044CVWS1320 M WILLEMAN

UNIONDALE / HAARLEM

ASSISTANT SUPERINTENDENT
WC044CVWS1783
T MAXEGWANA

GWAING

CHIEF PROCESS CONTROLLER
WC044CVWS1288
KA BORCHARDS

DEWATERING

SUPERVISOR (PROCESS CONTROLLER) x4
WC044CVWS1290 W BOOYSEN
WC044CVWS1291 BD SALMONS
WC044CVWS1308 N BOOYSEN
WC044CVWS1584 A SWART

PROCESS CONTROLLER
WC044CVWS5430
VACANT

PROCESS CONTROLLER x4
WC044CVWS5426 VACANT
WC044CVWS5427 VACANT
WC044CVWS5428 VACANT
WC044CVWS5429 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWS1310 I NOORDMAN
WC044CVWS1316 JF DU PREEZ

WC044CVSW1294 VACANT

WC044CVSW1776 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWS1295 VACANT

WC044CVSW1782 VACANT
WC044CVWS1995 VACANT
WC044CVWS5431 VACANT

CLEANING & MAINTENANCE

SUPERVISOR DRIVER
WC044CVWS5432
VACANT

HANDYMAN x2
WC044CVWS1303 J MALGAS
WC044CVWS1312 T BOYSEN

HANDYMAN
WC044CVWS1313
VACANT

WASTE WATER TREATMENT ASSISTANT x4
WC044CVWS1298 SP GINZA
WC044CVWS1301 DS MOKHOTHU
WC044CVWS5467 SS SMITH
WC044CVWS5468 P NKONYENI

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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SUB-SECTION
WASTE WATER TREATMENT WORKS SOUTH

SUPERINTENDENT: WATER POLLUTION CONTROL
WC044CVWS1766
D SAULS

CLERK: WASTE WATER TREATMENT
WC044CVWS1302 N TWIGG

OUTENIQUA
ULTRA FILTRATION PLANT
HEROLDS BAY
& BREAKWATER BAY

CHIEF PROCESS CONTROLLER
WC044CVWS1305
IM SPEELMAN

PROCESS CONTROLLER x9
WC044CVWS1289 TM MAWINDI
WC044CVWS1306 JC DU PREEZ
WC044CVWS1307 ZF MANYUBE
WC044CVWS1309 JJ VAN VUUREN
WC044CVWS5435 M POJIE

WC044CVWS1968 VACANT
WC044CVWS1969 VACANT
WC044CVWS5436 VACANT
WC044CVWS5437 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWS1293 G MICHAELS
WC044CVWS1300 TD SCHEEPERS
WC044CVWS1319 A CLAASSEN

WC044CVWS1311 VACANT

CLEANING & MAINTENANCE

SUPERVISOR DRIVER
WC044CVWS5434
VACANT

HANDYMAN: Waste Water Treatment Works West x3
WC044CVWS1297 RH CHERRY
WC044CVWS1902 T FEMELE

WC044CVWS1296 VACANT

WASTE WATER TREATMENT ASSISTANT x7
WC044CVWS1315 KJ JOM
WC044CVWS1317 E BOOYSEN
WC044CVWS1318 VJ MBOBI
WC044CVWS1771 M MCHACHA

WC044CVWS5417 VACANT

WC044CVWS2036 VACANT
WC044CVWS2070 VACANT

KLEINKRANTZ

CHIEF PROCESS CONTROLLER
WC044CVWS1292
J APRIL

PROCESS CONTROLER x4
WC044CVWS2037 VACANT
WC044CVWS2038 VACANT
WC044CVWS2069 VACANT
WC044CVWS2262 VACANT

HANDYMAN: Waste Water Treatment Works West
WC044CVWS1314
E STEARS

WATER PURIFICATION ASSISTANT x4
WC044CVWS1840 DS WANA

WC044CVWS1777 VACANT
WC044CVWS1778 VACANT
WC044CVWS1779 VACANT

WASTE WATER TREATMENT ASSISTANT x2
WC044CVWS5469
DL MEAS

WC044CVWS5470 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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LEGEND

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SECTION
WASTE WATER SERVICES (U/H)

ASSISTANT SUPERINTENDENT
WC044CVWS1783
T MAXEGWANA

UNIONDALE WWT

SUPERVISOR x4
WC044CVWS1619 LW MNYANDA
WC044CVWS4915 SH XABA
WC044CVDS4916 CP SAMSON
WC044CVWS4917 J DLAMINI

GENERAL WORKSMAN
WC044CVWS4934
F MAJOLLA

WATER PURIFICATION ASSISTANT x4
WC044CVWS1780 VACANT
WC044CVWS1900 VACANT
WC044CVWS4935 VACANT
WC044CVWS5466 VACANT

GENERAL ASSISTANT x2
WC044CVWS4938 L MEINTJIES
WC044CVWS4939 A HUMAN

HAARLEM WWT

PROCESS CONTROLLER x4
WC044CVWS4937 VACANT
WC044CVWS4942 VACANT
WC044CVWS4944 VACANT
WC044CVWS4945 VACANT

WATER PURIFICATION ASSISTANT x4
WC044CVWS5446 VACANT
WC044CVWS5447 VACANT
WC044CVWS5450 VACANT
WC044CVWS5451 VACANT

HANDYMAN
WC044CVWS4946
VACANT

GENERAL ASSISTANT x2
WC044CVWS4940 VACANT
WC044CVWS4941 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

BRANCH
ROADS & STORM WATER SERVICES

DEPUTY DIRECTOR: STREETS & STORM WATER SERVICES
WC044CVRS1907
RL DANIELS

SENIOR CLERK
WC044CVMC2295
VACANT

SUB - SECTION
STREETS

SUPERINTENDENT: STREETS & STORM WATER
WC044CVRD1471
C TEKANA

SUB - SECTION
STORM WATER

SUPERINTENDENT: STORM WATER
WC044CVSW1911
DR NAIDOO

SECTION
MAINTENANCE CONTRACTS

MANAGER: MAINTENANCE CONTRACTS
WC044CVMC1328
AL NORTJE

SMALL CONTRACTORS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND

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CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

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SUB - SECTION
STREETS

SUPERINTENDENT: STREETS & STORM WATER
WC044CVRD1471
C TEKANA

UNIT
ROAD SIGNS & MARKINGS

FOREMAN: STREETS & STORMWATER
WC044CVRD1521
RL CEDRAS

UNIT
ROAD REPAIRS

FOREMAN: STREETS & STORMWATER
WC044CVRD1472
MN HALA

UNIT
ROAD RESERVE MAINTENANCE & GRAVEL ROADS

FOREMAN: STREETS & STORMWATER
WC044CVRD2064
VACANT

STREETS & STORM WATER U/H

ASSISTANT SUPERINTENDENT
WC044CVRD4885
VACANT

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

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UNIT
ROAD SIGNS & MARKINGS

FOREMAN: STREETS & STORM WATER
WC044CVRD1521
RL CEDRAS

SUPERVISOR (LINES AND SIGNS)
WC044CVRD1127
JAM BUIS

TRAFFIC ASSISTANT: STREETS & STORM WATER X3
WC044CVRD1182 LE MAPOTA
WC044CVRD1186 GF MICHAELS

WC044CVRD1185 VACANT

SUPERVISOR (LINES AND SIGNS)
WC044CVRD1090
FB LOMBARD

TRAFFIC ASSISTANT: STREETS & STORM WATER X3
WC044CVRD1180 FA GOZONGO
WC044CVRD1184 Z MTATI
WC044CVRD1187 A JANSEN

TRAFFIC ASSISTANT: STREETS & STORM WATER x2
WC044CVRD1181 CE LOUW
WC044CVRD2211 N A MALIFI

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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UNIT
ROAD REPAIRS

FOREMAN: STREETS & STORM WATER
WC044CVRD1472
MN HALA

SUPERVISOR/DRIVER OPERATOR
WC044CVRD1483
KW GAMANA

SMALL PLANT OPERATOR
WC044CVRD1573 VACANT

STREET & STORM WATER ASSISTANT x6
WC044CVRD1509 S ROELFSE
WC044CVRD1529 J MICHEALS
WC044CVRD1533 M ERASMUS
WC044CVRD1541 CAP ABRAHAMS
WC044CVRD1565 Z KHETHYE
WC044CVRD1579 M FORTUIN

SENIOR SUPERVISOR/DRIVER
WC044CVRD1772
Z GONGQA

SMALL PLANT OPERATOR x2
WC044CVRD1496 A LOLWANA

WC044CVRD1552 VACANT

STREETS & STORM WATER ASSISTANT x6
WC044CVRD1508 ZS QEBA
WC044CVRD1516 A JOKO
WC044CVRD1557 SG NDANDA
WC044CVRD1554 T MOSES
WC044CVRD1580 M MBANJANE

WC044CVRD1558 VACANT

SENIOR SUPERVISOR/DRIVER
WC044CVRD1494
SA TAMBOER

STREETS & STORM WATER ASSISTANT x4
WC044CVRD1530 B BOOISE
WC044CVRD1532 J BOTMAN
WC044CVRD1535 AR CRONJE
WC044CVRD1542 N PIETERSE

SENIOR SUPERVISOR/DRIVER
WC044CVRD1561
VJ VELI

STREETS & STORM WATER ASSISTANT X3
WC044CVRD1531 S NODAYINGE
WC044CVRD1578 RG AMAS

WC044CVRD1534 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

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UNIT
ROAD RESERVE MAINTENANCE & GRAVEL ROAD

FOREMAN: STREETS & STORM WATER
WC044CVRD2064
VACANT

ROAD RESERVE

SENIOR SUPERVISOR/DRIVER
WC044CVRD1756
L MATA

DRIVER OPERATOR x2
WC044CVRD1539 M KETELO

WC044CVRD1478 VACANT

STREET & STORM WATER ASSISTANT X8

WC044CVRD1491 M JACKSON
WC044CVRD1556 BC REYNERS
WC044CVRD1576 LE XALISA

WC044CVRD1512 VACANT
WC044CVRD1513 VACANT
WC044CVRD1514 VACANT
WC044CVRD1515 VACANT
WC044CVRD1525 VACANT

PAVING REPAIR

SENIOR SUPERVISOR/DRIVER
WC044CVRD1528
A BRITZ

HANDYMAN: ROADS & STORM WATER
WC044CVRD2028
J GOEIEMAN

DRIVER OPERATOR
WC044CVRD1538
H PORTLAND

STREET & STORM WATER ASSISTANT X3

WC044CVRD1479 VACANT
WC044CVRD1553 VACANT
WC044CVRD1559 VACANT

MAINTANANCE & REPAIR TEAM A

DRIVER/OPERATOR: GRADER
WC044CVRD1546
M NONDABULA

DRIVER/ROLLER OPERATOR:
STREETS & STORM WATER
WC044CVRD1474
P A CAROLUS

DRIVER OPERATOR: STREETS & STORM WATER
WC044CVRD1547
K KONSTABEL

DRIVER OPERATOR
WC044CVRD1549
Z MBOVANE

OPERATOR (FRONT END LOADER)
WC044CVRD1475
LE NDONGENI

STREET & STORM WATER ASSISTANT (Safety)
WC044CVRD1545
K LAMINIE

MAINTANANCE & REPAIR TEAM B

DRIVER/OPERATOR: GRADER
WC044CVRD5441
S SKIPPERS

DRIVER/ROLLER OPERATOR:
STREETS & STORM WATER
WC044CVRD1548
A SAAYMAN

DRIVER OPERATOR
WC044CVRD1551
SL BUYS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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UNIT
STREETS AND STORM WATER U/H

ASSISTANT SUPERINTENDENT: STREETS & STORM WATER
WC044CVRD4885
VACANT

UNIONDALE

SUPERVISOR DRIVER
WC044CVRD1493
C VAN RENSBURG

SMALL PLANT OPERATOR x4

WC044CVRD1849 J MEYER
WC044CVRD4905 J JACOBS
WC044CVRD4947 N DE KELLA
WC044CVRD4948 DA JULIES

HANDYMAN
WC044CVRD4891
M PLAATJIES

SPECIAL WORKSMAN
WC044CVRD4890
P JANTJIES

HAARLEM

SUPERVISOR
WC044CVRD4906
P CORNELIUS

DRIVER OPERATOR: GRADE 1
WC044CVRD4876
VACANT

SMALL PLANT OPERATOR x2
WC044CVRD4902 ER MACCLUNE

WC044CVRD4894 VACANT

SMALL PLANT OPERATOR
WC044CVRD4895
F DAVIDS

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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SUB - SECTION
STORM WATER

SUPERINTENDENT: STORM WATER
WC044CVSW1911
DR NAIDOO

UNIT
STRUCTURES, KERBS & MAINTENANCE

FOREMAN: STREETS AND STORM WATER
WC044CVSW1443
SH MTWAZI

UNIT
CANALS & PIPELINE CONSTRUCTION & MAINTENANCE

FOREMAN: STREETS & STORM WATER
WC044CVSW2063
DR ARENDSE

WILDERNESS

SUPERVISOR/DRIVER OPERATOR
WC044CVRD1582
C M HATCHES

TRACTOR DRIVER: ROADS
WC044CVRD1583
WJ RUITERS

SMALL PLANT OPERATOR: ROADS
WC044CVRD5462
WE VAN STADEN

STREET & STORM WATER ASSISTANT x5
WC044CVRD1590 H CUPPS
WC044CVRD1591 CM RADEMEYER

WC044CVRD1592 VACANT
WC044CVRD1593 VACANT
WC044CVRD1595 VACANT

SUB - SECTION
STORES

STOREMAN: STORM WATER AND STORE
WC044CVSW5445
VACANT

STORES ASSISTANT: STREETS & STORM WATER
WC044CVSW1505
R NOVEMBER

LEGEND

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GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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UNIT
STRUCTURES, KERBS & MAINTENANCE

FOREMAN: STREETS AND STORM WATER
WC044CVSW1443
SH MTWAZI

STRUCTURES

SENIOR SUPERVISOR/DRIVER
WC044CVSW1482
ZP HESI

HANDYMAN: ROADS & STORM WATER
WC044CVSW1567 A NORTJE

WC044CVSW2027 VACANT

SMALL PLANT OPERATOR
WC044CVSW1540
E ELLIS

STREET & STORM WATER ASSISTANT x2
WC044CVSW1480 V NGQEZU
WC044CVSW1510 RJ MONYANE

KERBS

SENIOR SUPERVISOR/DRIVER
WC044CVSW1507
D JUMAT

STREETS & STORM WATER ASSISTANT x3
WC044CVSW1536 R FANISO
WC044CVSW1570 A DAVIDS
WC044CVSW1571 CP BIEL

SENIOR SUPERVISOR/DRIVER
WC044CVSW1477
DEG PEDRO

HANDYMAN: ROADS & STORM WATER
WC044CVSW1487
J VAN RENSBURG

STREETS & STORM WATER ASSISTANT x2
WC044CVSW1502 VACANT
WC044CVSW1503 VACANT

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
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UNIT
CANALS & PIPELINE CONSTRUCTION & MAINTENANCE

FOREMAN: STREETS & STORM WATER
WC044CVSW2063
DR ARENDSE

CANALS

SENIOR SUPERVISOR/DRIVER
WC044CVSW1522
AC BERNARDO

STREET & STORM WATER ASSISTANT X2
WC044CVSW1563 JM MUNSAMY
WC044CVSW1974 RH MULLER

SENIOR SUPERVISOR/DRIVER
WC044CVSW1506
RW HECTOR

SMALL PLANT OPERATOR
WC044CVSW5378
VACANT

STREETS & STORM WATER ASSISTANT x2
WC044CVSW1574 JET MULLIGAN

WC044CVSW1575 VACANT

SENIOR SUPERVISOR/DRIVER
WC044CVSW1481
S MATIWANE

DRIVER OPERATOR
WC044CVSW1473
A JANETT

SUPERVISOR/DRIVER
WC044CVSW5463
VACANT

HANDYMAN: ROADS & STORM WATER
WC044CVSW1910
H VAN ROOYEN

SMALL PLANT OPERATOR
WC044CVSW1495
VACANT

STREET & STORM WATER ASSISTANT x2
WC044CVSW1555 XA MATSHAULE
WC044CVSW1564 BW VAN ROOYEN

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

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DIVISION
SUPPORT SERVICES

SENIOR MANAGER: SUPPORT SERVICES
WC044CVSSS2274
VACANT

GIS

SENIOR ENGINEERING TECHNICIAN
WC044CVPM1321
FJ ABRAHAMS

SUB - SECTION
COMPLAINT INVESTIGATION

ADMINISTRATOR: COMPLAINTS INVESTIGATION
WC044CVPM1909
VACANT

SENIOR CLERK: COMPLAINTS x4
WC044CVPM1905 NI GWADISO
WC044CVPM2267 S SMITH

WC044CVPM1616 VACANT
WC044CVPM2268 VACANT

STUDENT CLERK X2
EPWP

SUB - SECTION
ADMINISTRATIVE SUPPORT

SENIOR ADMINISTRATIVE OFFICER
WC044CVPM1612
D EDWARDS

SECURITY GUARD
WC044CVPM6386
VACANT

CHIEF CLERK: HEALTH & SAFETY
WC044CVPM6460
VACANT

PRINCIPAL CLERK: ENGINEERING SERVICES
WC044CVPM1615
J PYLER

SENIOR CLERK
WC044CVPM1614
E MOOI

OFFICE ASSISTANT
WC044CVPM1617
K HANSEN

GENERAL ASSISTANT
WC044CVPM1618
LV STUURMAN

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

LEGEND
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BRANCH
INFRASTRUCTURE PLANNING AND PROJECT MANAGEMENT

DEPUTY DIRECTOR: PLANNING SECTION
WC044CVPM1264
L MOOIMAN

SECTION
ADMINISTRATIVE SUPPORT

SECRETARY / TYPIST
WC044CVPM1455
G VAN NIEKERK

DIVISION
LAND DEVELOPMENT

MANAGER: LAND DEVELOPMENT
WC044CVPM1324
R FIVAZ

DIVISION
PROJECT MANAGEMENT (PMU)

MANAGER: PROJECTS
WC044CVPM1322
AJ VAN MOLENDORFF

B F I 5 YEAR CONTRACT

MANAGER: PROJECTS x3
WC044CVPM1795 A SCHEEPERS
WC044CVPM1796 G DE SWARDT

WC044CVPM2026 VACANT

B F I 5 YEAR CONTRACT

PROJECT TECHNICIANS x3
WC044CVPM0819 RAG JACOBS

WC044CVPM1966 VACANT
WC044CVPM2039 VACANT

DIVISION
INFRASTRUCTURE PLANNING SERVICES

MANAGER: INFRASTRUCTURE PLANNING
WC044CVPM1267
M GEYER

TRAFFIC ENGINEERING

SECTION
INFRASTRUCTURE PLANNING

CHIEF ENGINEERING TECHNICIAN:
TRAFFIC & TRANSPORT ENGINEERING
WC044CVPM1323
ZE VANQA

LEGEND

- FILLED POST
- VACANT URGENT – BUDGETED
- VACANT – BUDGETED
- VACANT – UNFUNDED
- NOT AUDITED

GEORGE MUNICIPALITY
ORGANIZATIONAL STRUCTURE – SEPTEMBER 2022
DIRECTORATE: CIVIL ENGINEERING SERVICES

CONFIRMED DIRECTOR: _____ DATE: 28/09/2022

APPROVED MUN MNGR: _____ DATE: 29/09/2022

DIVISION
PROJECT MANAGEMENT (PMU)

MANAGER: PROJECTS
WC044CVPM1322
AJ VAN MOLENDORFF

SENIOR ADMINISTRATOR: PROJECTS
WC044CVPM2276
LG CARELSE

TECHNICIAN: PROJECTS x2
WC044CVPM1797 VACANT
WC044CVPM2277 VACANT